

Coal Age

FEBRUARY, 1944



COAL AND WAR IN 1943

LUBRICATION COSTS *cut 30%*

SUN MINE LUBRICANTS

prevent unnecessary breakdowns . . . speed coal output

Coal mining equipment—cars, locomotives, cutters, loaders, conveyors, all down the line—have a tough job to do today. They have to be kept on the job—every minute.

Too-frequent equipment failure troubled one mine operator until he found that the cause of it was faulty lubrication. A policy of "shopping around" among producers of lubricants was not the answer to the problem. So this operator decided to standardize—to give one line of lubricants the responsibility for keeping all his equipment on the job all the time.

Tests of various lubricants over a period of several months showed that Sun Mine Lubricants were giving the best performance.

With the help of a Sun Engineer, this operator standardized on the Sun Lubricants which were recommended for the various applications in the mine.

Standardization on Sun was a complete success—lubrication costs went down 30%, and stayed there. And during the several years since, not a single piece of equipment has failed because of faulty lubrication.

Why not standardize on one line of lubricants? Ask a Sun Engineer to show you how Sun Mine Lubricants can solve your problem of supply and, perhaps, give you lower costs and higher production. Just write . . .

SUN OIL COMPANY • Philadelphia 3, Pa.
Sun Oil Company, Ltd., Toronto, Canada



SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA



Rubber like glass puts gloss on glue

A typical example of B. F. Goodrich improvement in rubber

GLUE is sold to industrial users by the barrel in clear, smooth flakes. To make it clear they used to pour a melted mixture onto glass plates, let it set, then break it off in flakes.

A manufacturer developed a faster, better process, pouring onto a moving rubber belt and slicing off with a moving knife — but the glue was always cloudy. The rubber wasn't smooth enough — and buyers regarded clearness as an indication of quality.

The manufacturer came to B. F. Goodrich. Could rubber be made with

a smooth, firm surface, more like the glass plates? The research men not only developed a rubber that left the glue as clear and glossy as before but designed a belt that stands the heat of the glue, has raised edges to keep it from running over and is so uniform in thickness that the knife can cut the glue without touching the belt. It made the new method of glue making a complete success.

B. F. Goodrich research and development work is continuous, and product improvement is a permanent

policy. It applies to nearly every kind of rubber or flexible synthetic article used in war or peace. No product is regarded as finished or standardized or too small to bother with. So check with a B. F. Goodrich distributor before you buy. Don't decide any product you may be using is the best to be had until you've found out what B. F. Goodrich may have done in recent months to improve it. *The B. F. Goodrich Company, Industrial Products Division, Akron, O.*

B. F. Goodrich
RUBBER and SYNTHETIC products



Madame Marie Curie,
once a governess in Warsaw, fled
from that city to Paris where, after
years of laborious research, she
obtained radium from pitchblende.

TO DO ONE THING—AND

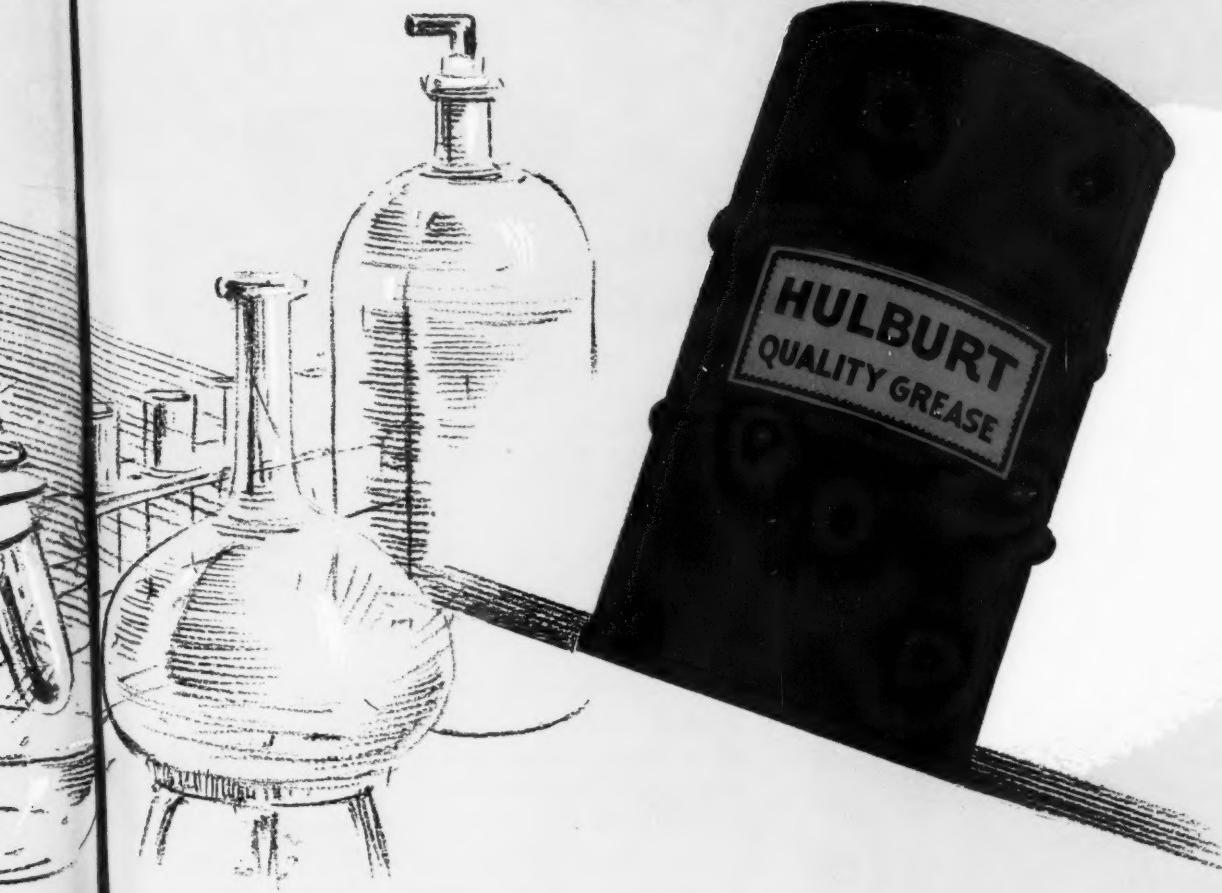
The name of Madame Marie Curie is forever linked with her one supreme achievement — the discovery of radium. Its uses opened new horizons to science.

The
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HULBURT

Quality

GREASE



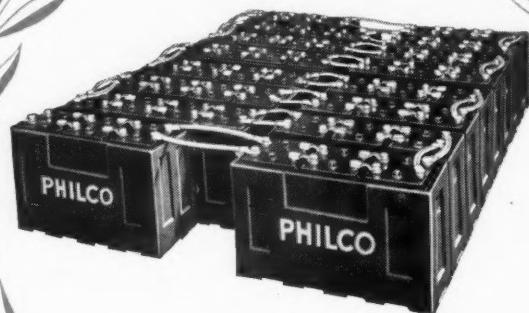
ENDO IT SUPREMELY WELL!

The name HULBURT is linked with one specialized product... HULBURT QUALITY GREASE, perfected by 25 years of research and practical experience, solely for lubricating coal mine equipment.

HULBURT OIL & GREASE COMPANY
Specialists in Coal Mine Lubrication
PHILADELPHIA, PENNSYLVANIA

PHILCO Mine Batteries

FOR MORE COAL
ON EVERY SHIFT!



TYPICAL PHILCO MINE LOCOMOTIVE BATTERY
MADE UP OF TYPE 25 AMA MONOBLOC UNITS

REPLACE WITH RUGGED PHILCO BATTERIES

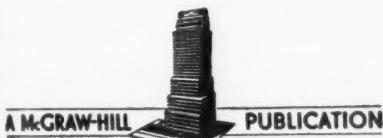


Philco Corporation, Storage Battery Division, Trenton 7, N. J.

Coal Age

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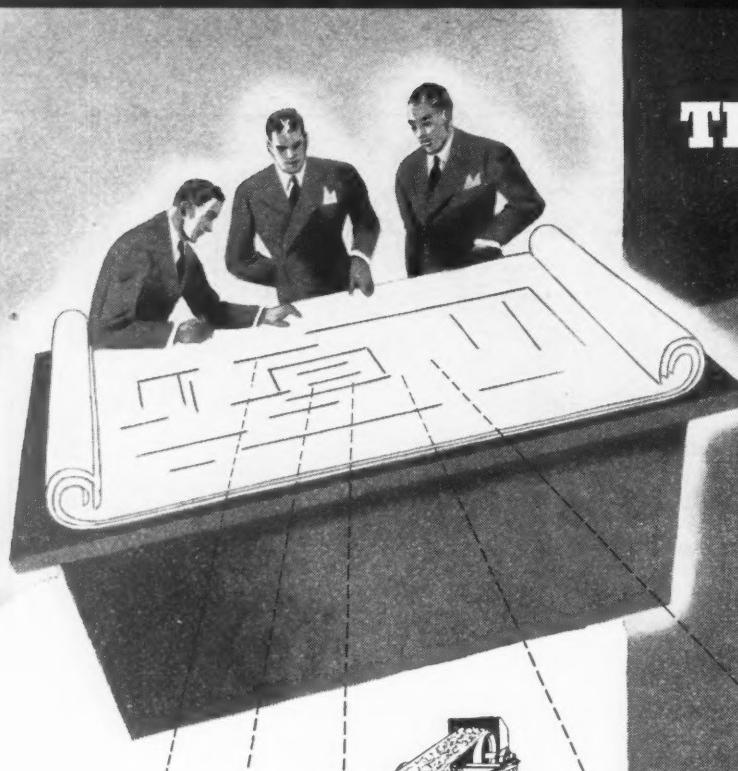
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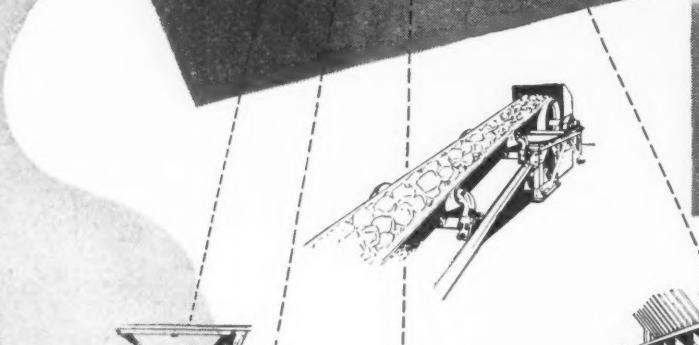
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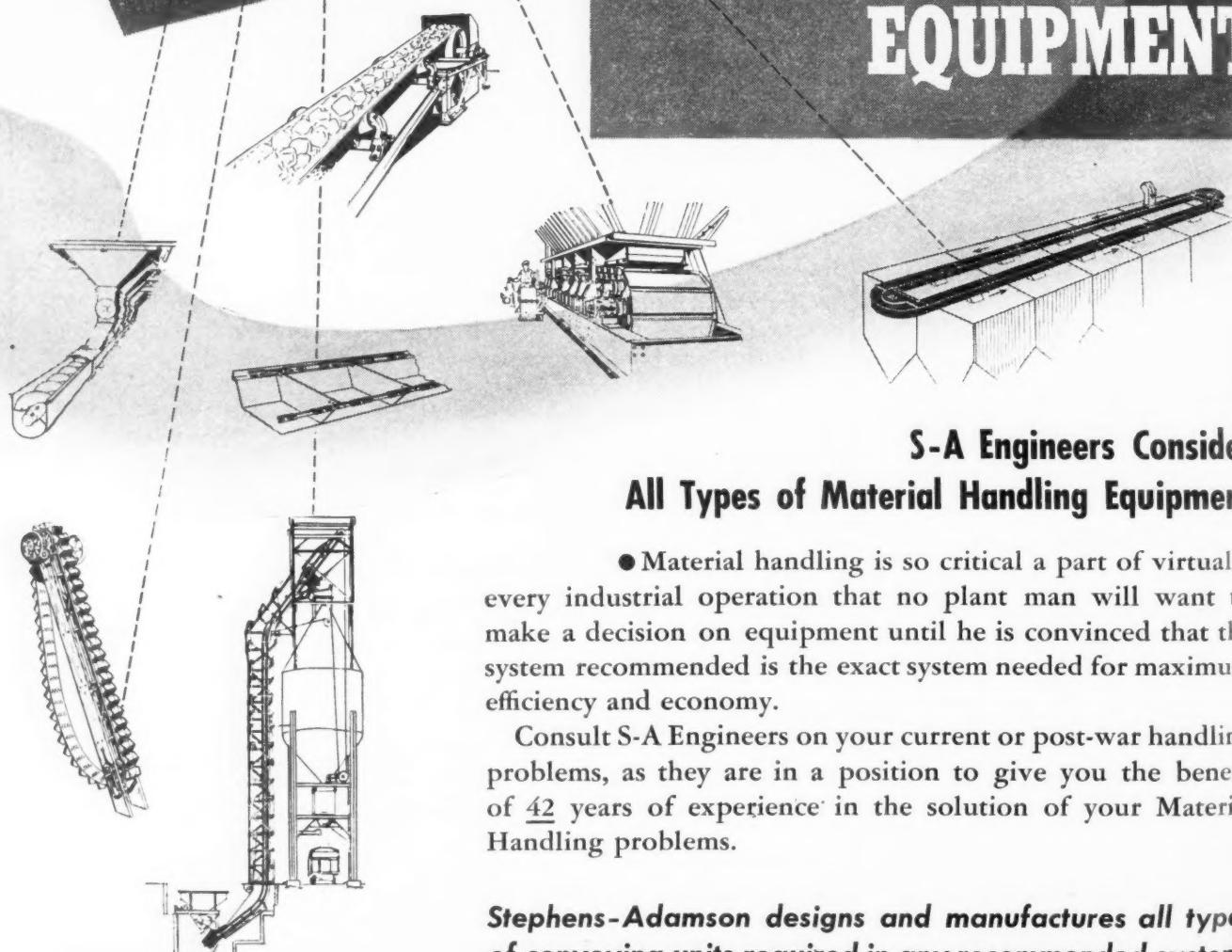
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EQUIPMENT



**S-A Engineers Consider
All Types of Material Handling Equipment**

• Material handling is so critical a part of virtually every industrial operation that no plant man will want to make a decision on equipment until he is convinced that the system recommended is the exact system needed for maximum efficiency and economy.

Consult S-A Engineers on your current or post-war handling problems, as they are in a position to give you the benefit of 42 years of experience in the solution of your Material Handling problems.

Stephens-Adamson designs and manufactures all types of conveying units required in any recommended systems

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STEPHEN S-A D A M S O N
MFG. CO.

*Designers and Manufacturers of All Types of
BULK MATERIAL HANDLING EQUIPMENT*

AN IMMEDIATE DRILLING

answer

TO REDUCE PRODUCTION COSTS.....



- QUALITY MATERIAL
- LIGHTER WEIGHT
- COMPLETE RIGIDITY
- ACCURATE ALIGNMENT
- LOWER POWER COSTS
- MINIMUM AUGER WEAR
- SMOOTH VIBRATIONLESS OPERATION

★ COALMASTER Blast Hole Drilling Tools are made for every type of job. Used in "complete matched sets" they deliver maximum results. These combinations are designed specifically to break up the coal or rock and convey these materials out of the drill hole quickly and with minimum effort.

Investigate COALMASTER not only as an answer to immediate drilling problems but for the long time operation ahead.

COALMASTER TOOLS are made in sizes from $1\frac{1}{2}$ " up—to drill correct holes for all powder, Cardox, Airdox, Hydraulic, and special requirements. They are made in types for Handheld Drills—for Post and Machine-mounted Drills—for Strip Pit Drills.



COALMASTER

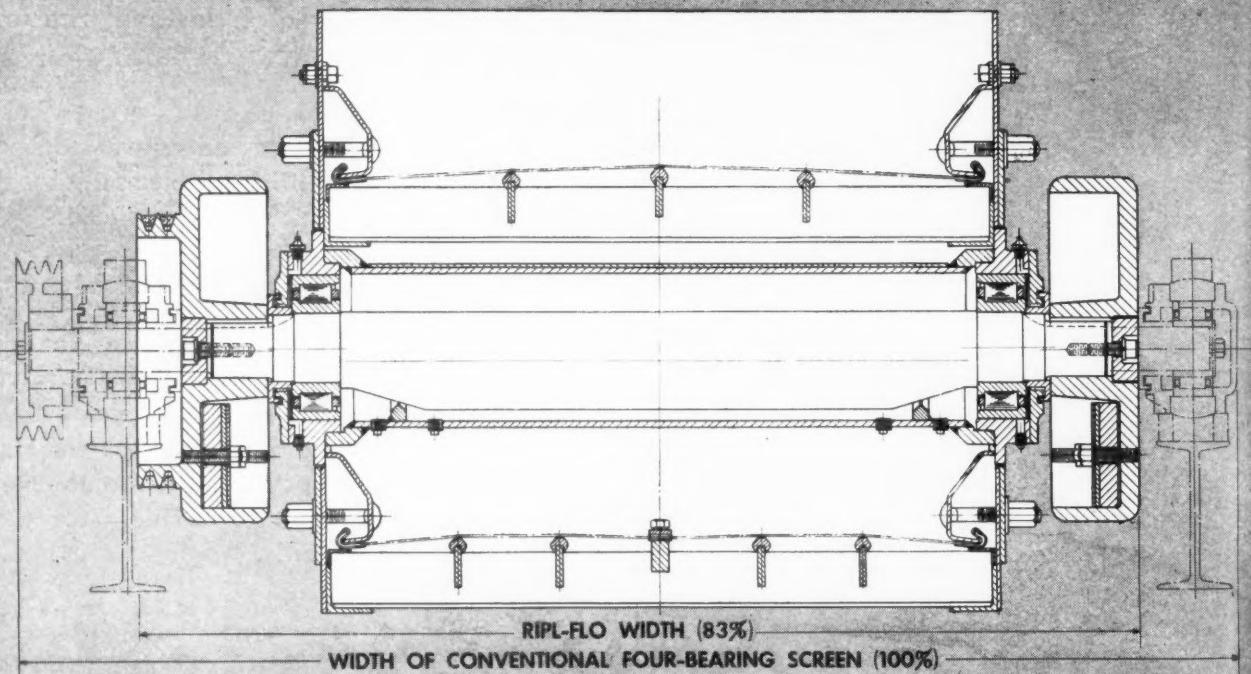
BLAST HOLE
DRILLING
Tools

CENTRAL MINE EQUIPMENT CO.

ST. LOUIS, MO.

You Buy You Get

Great Equipment



THERE ARE FIVE THINGS you look for when you buy a screen: 1. Continuous service. 2. Efficient screening. 3. Minimum attention. 4. Rugged, simplified design. 5. Low initial cost.

Allis-Chalmers Ripl-Flo Vibrating Screens (see

exterior view below) give you all five. New Ripl-Flo construction eliminates 2 outer bearings, yet it's warranted to perform the same, or better, screening job than 4-bearing screens. Width and weight reduced—you save on lower

initial cost and power consumption. Other advantages: Perfect circle throw; Patented integral counterbalance shaft; No stationary support frame; All welded parts stress-relieved; Uniform vibration. Write for bulletin B6151A.

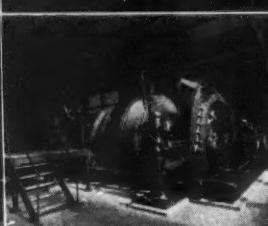
Only
Allis-Chalmers
Makes
a Complete Line
of this Equipment!

Vibrating Screens



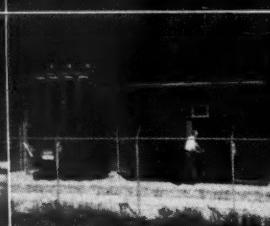
Efficient separation and de-watering — 8 different types.

Mine Hoists



Completely automatic control with new "REGULEX" exciter.

Unit Substations



Modern, factory-built units save space, copper, steel.

Turbines



Steam & hydraulic, line power, electrical equipment.

One... Both!

2 Great Engineering Cooperation

HOW WOULD YOU LIKE to have your operating revenue increased \$40 per hour?

That's what one southern coal company got after they accepted A-C Cooperative Engineering recommendation and installed a 6 by 14 foot triple-deck Ripl-Flo Vibrating Screen.

As in many southern mines, their coal came from water holes . . . the carbon separated contained as high as 5.7% moisture. This, coupled with the many thin flakes made the coal difficult to screen.



But when they installed Ripl-Flo with its uniform circle throw design, the tendency of the material to stick together was overcome . . . Ripl-Flo rolled it over and over . . . screening an average of 152 TPH, with peak loads up to 193 TPH! And because they made a $\frac{1}{8}$ inch square

separation on the bottom deck, they got 34% extra stoker product.

Averaging 94 TPH of stoker coal, which contained only 2% less than

$$\begin{array}{r} \text{32 TPH} \\ \times \$1.25 = \$40. \end{array}$$

1/16 inch square product, this meant they were reclaiming an extra 32 TPH. At the then-prevailing price differential of \$1.25 per ton it all added up to an increase in revenue of \$40 per hour!

What's more, the Ripl-Flo, which eliminates all superfluous parts, re-

quired only 6 hp to operate, against 15-20 hp for other screens. It's easy to see why this company recently ordered two more identical screens.

This is just another example of how Allis-Chalmers Cooperative Engineering aids the coal industry.



If you have any particular problem or need new equipment, don't hesitate to contact our nearest district office. Or write direct to ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 1691B

ALLIS-CHALMERS



WE WORK FOR
VICTORY



WE PLAN FOR
PEACE

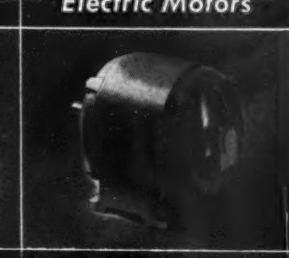
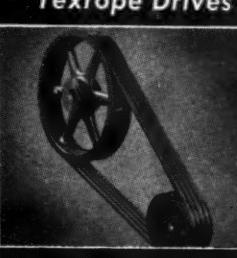
Tractors

Rectifiers

Centrifugal Pumps

Texrope Drives

Electric Motors



Other
Patented
stationary
s-relieved:
B6151A

ines

draulic, line
rical equipment

COAL AGE

hoe and wheel types for
hauling and stripping.

Low-loss conversion of a-c into
versatile d-c current.

Largest line, highest efficiencies — built with motors.

Save critical materials by use
with high-speed motors.

1/2 hp to 5000 hp — a-c and
d-c — all types with control.

A merchant in Baltimore asks:

Can miners' children get a good education?

They certainly can. Miners' children have as good a chance to acquire an education as have children anywhere in the United States. State school laws and Federal child labor laws apply equally to all children of school age. In fact, miners' children often have educational and recreational advantages above the average. Many mine companies encourage and support playgrounds, summer camps, libraries, elementary schools, training schools, child-care and home guidance programs. When a miner's children grow up they are as free and well-qualified as any other children to choose their own occupations. Thousands of miners' children go on to college and technical institutions or take extension courses offered by State Universities.

A clerk in Milwaukee asks:

Is the production of bituminous coal keeping pace with America's war needs?

The answer is truly inspiring! In 1943 our mines produced 585,000,000 tons of bituminous coal — the greatest amount of coal ever mined in one single year in the United States or any other country. The only year that approached it was 1942, and 1943 beat that by more than 5,000,000 tons.

This showing is all the more remarkable when you consider that more than 70,000 trained mine workers are in the armed services or in other war-essential industries — and that, during the year production of more than 65,000,000 tons was lost because of strikes, slowdowns and unwarranted absenteeism.

One thing that made this vast volume of production possible was the investment of \$100,000,000 in mechanical safety and operating equipment during the past twenty years. This investment was made, for the most part, in the depression years. The foresight of the bituminous producers in making so heavy an investment in new equipment at a time so critical is now finding its reward in today's production records.

We welcome your QUESTIONS about our Industry

Nearly everybody has ideas and opinions about bituminous coal and the men who mine it. Doubtless many have questions they'd like to ask about the industry.

We are eager to answer such questions, because we are glad to tell you about our industry. Its practices and policies are an open book.

You will find, as we answer your questions, that the operators are taking their responsibilities seriously,

and that the men who work in the mines live pretty much the same kind of lives as workmen everywhere.

The bituminous producers gladly accept this assignment to keep you informed and up to date on their business. They consider it a part of their duty as good citizens, good employers, and producers of America's No. 1 source of heat and energy.

BUY MORE WAR BONDS

**BITUMINOUS COAL
Institute**

60 East 42nd Street, New York 17, N.Y.

February, 1944 • COAL AGE

CURRENT COLLECTION COSTS CUT 75% BY USING MODERN O-B TROLLEY SHOES

Actual Field Test Shows Type L Trolley
Shoes Outlive Trolley Wheels 26 to 1
... Shoe Collection Costs Per Ton-Mile
One-Fourth that of Trolley Wheels



	Trolley Wheel	Trolley Shoes
Collector Cost	\$4.70	\$8.60
Replacement parts (axles, etc.)	1.32	-0-
Labor to install replacement parts		
Lubricant for trolley wire	1.00	15.75
Labor to apply lubricant	-0-	22.50
Total collector cost per unit	-0-	\$46.85
Amount of coal hauled per collector	\$7.02	100,000 tons
Cost per ton Collector	3900 tons	\$0.000469
Length of Haulage	7 miles	7 miles
Collector cost per ton-mile	\$0.000264	\$0.000067

*Based on Actual test at producing Mine. Both Shoes and wheels were operated under conditions as nearly identical as possible. Re-use of unworn parts not considered. For more complete details about the test and the results obtained, see O-B Haulage Ways, February, 1944. Write for your copy.

For Longer Wire Life . . .
Lower Collection Costs . . .
Specify O-B Trolley Shoes

Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

KEEP BUYING WAR BONDS



TEXACO

STRIPPER

in action!

OFF with the overburden — out with the coal. Industry's wartime needs must be met.

These big stripping shovels handle 35 cubic yards at a bite, and depend for their almost human movements upon wire rope.

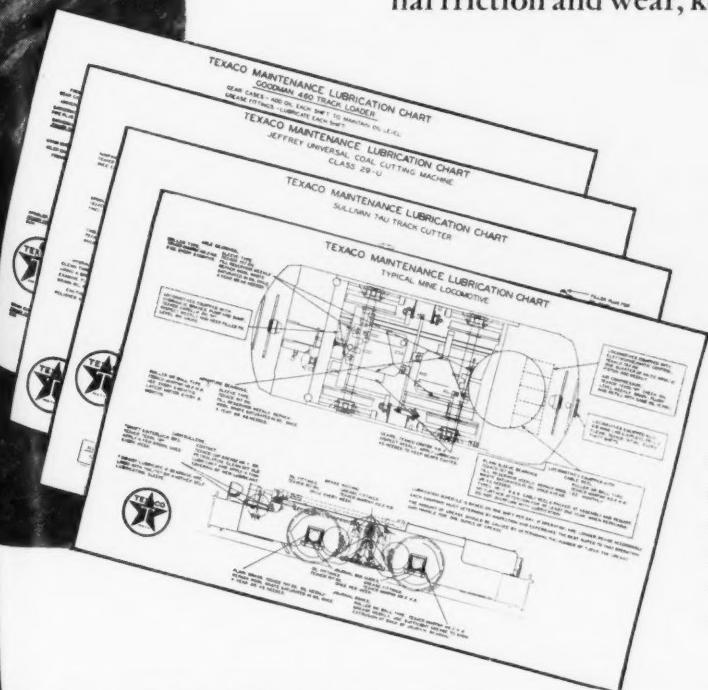
Keeping wire rope stronger, making gears and rope last longer, is a job for *Texaco Crater*.

Texaco Crater penetrates to the very core of wire rope, sealing each wire in a tough, viscous film that reduces internal friction and wear, keeps out moisture, rust and corrosion.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, *National Sales Division, Dept. C, 135 East 42nd Street, New York 17, N. Y.*

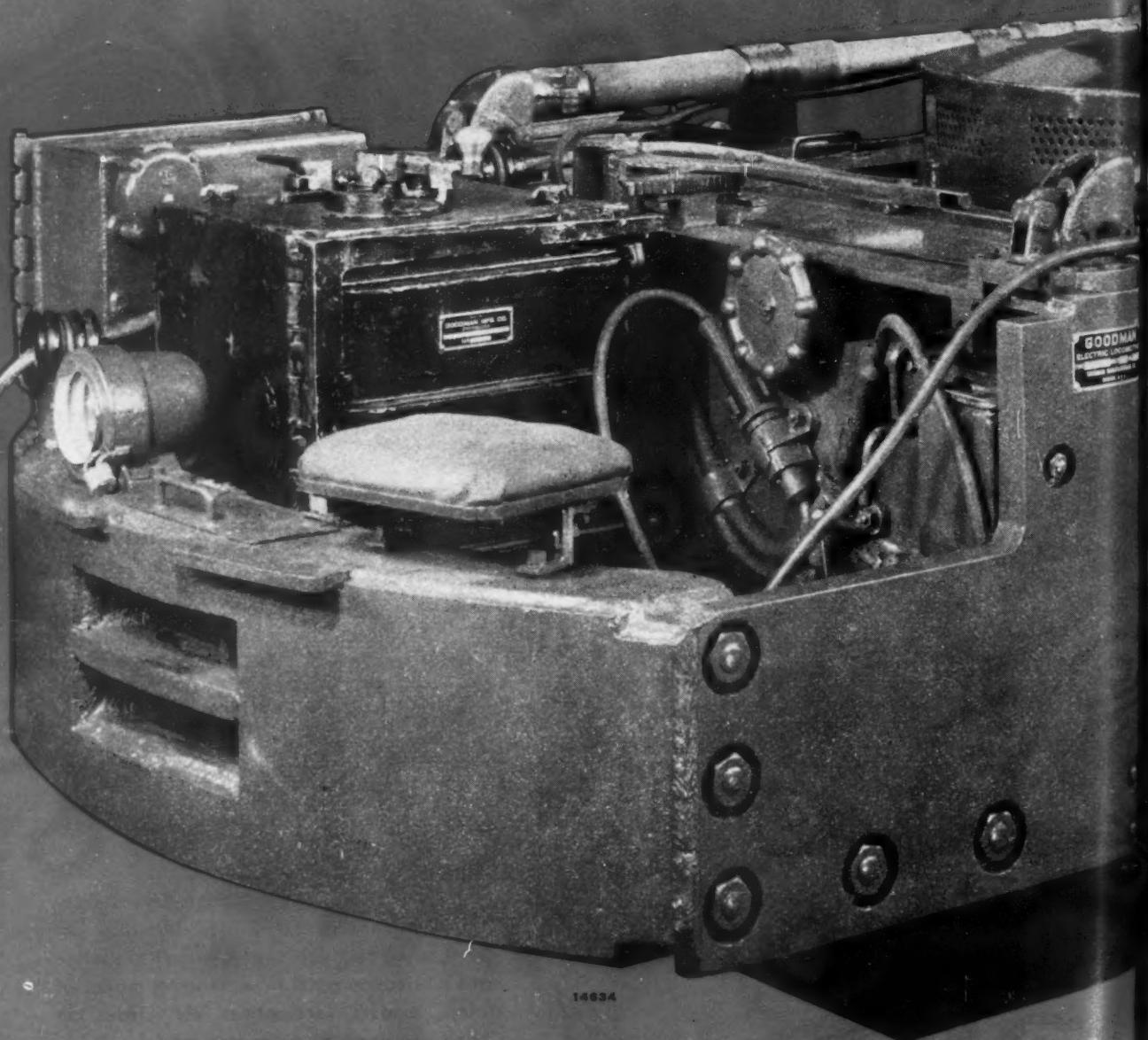


Texaco Maintenance Lubrication Charts show not only where to use Crater, but also just where, when and with what lubricant to service each lubrication point in all leading makes of cutters, loaders, locomotives, etc. Order the Charts you need by make and model.



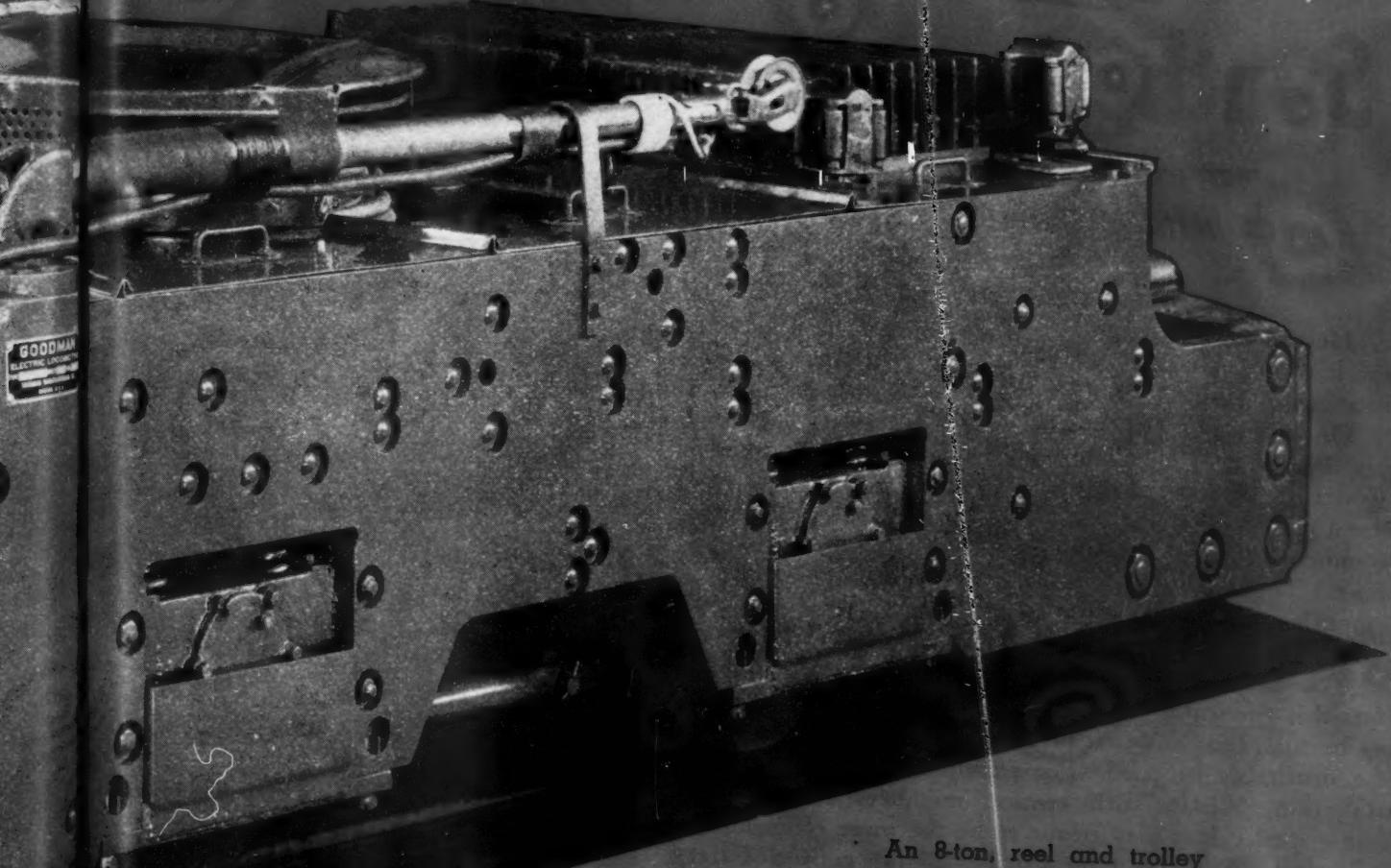
CRATER

Goodman Safety



GOODMAN MANUFACTURING COMPANY

Gathering Locomotives



An 8-ton, reel and trolley
locomotive with explosion
tested electrical equipment.



N.Y.
HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

On This Screw Machine . . .

GATES V-Belts of Special Synthetic Rubber

**wear more than 3-TIMES as long
as belts of NATURAL Rubber!**

Here is an excellent example of how well it pays to consult the Gates Field Engineer on any problem of drive operation.

On the screw machine pictured above, the Macomb Screw Products Company used natural rubber V-belts, getting 6 to 8 months' wear at 12 to 18 hours per day. Because a severe oil condition existed, the Gates Field Engineer recommended changing to Gates V-belts of special synthetic rubber. These special synthetic belts are averaging 18 to 24 months' wear at 24 hours per day—an increase of 300% to 400% in belt life!

You may not have in your plant any drive which offers this particular problem—yet other service conditions may be such that a V-belt of some special construction can most profitably be used. For example, in your particular installation, V-belts with tension members composed of flexible steel cables may prove to be the most efficient and economical. Again, Rayon Cord V-belts or Static-Safety V-belts may best fit your special need.

In any case, the wisest move you can make is to phone the Gates Field Engineer. He is thoroughly competent to analyze any drive problem. He is completely informed on the nature and advantages of every type of belt. He will always recommend the practice that will be most efficient and economical for you.

THE GATES RUBBER COMPANY
Engineering Offices and Stocks in All Large Industrial Centers

GATES

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2213 Griffin Street

NEW YORK CITY
215-219 Fourth Avenue

VULCO ROPE

ATLANTA, GA.
738 C & S National Bank Building

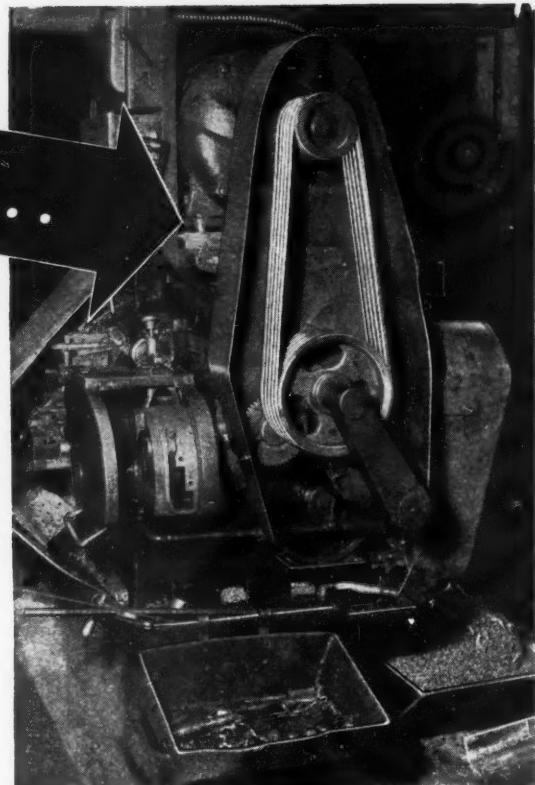
PORRTLAND, ORE.
333 N. W. 5th Avenue

DRIVES

LOS ANGELES, CAL.
2240 East Washington Boulevard

SAN FRANCISCO, CAL.
1090 Bryant Street

DENVER, COLO.
999 South Broadway



Your Gates Field Engineer Can Tell You Whether YOU Need—

① Special Synthetic
V-Belts

② Steel Cable
V-Belts

③ Cotton Cord
V-Belts

④ Static-Safety
V-Belts

⑤ Rayon Cord
V-Belts

**Your Telephone Directory
Will Give You the Gates
Field Engineer's Phone
Number**



PERMISSIBLE EXPLOSIVES

FOR EITHER MECHANICAL
OR HAND LOADING

THROUGH intensive research, chemical control, inspection and unremitting care in manufacture this list of permisibles has been designed to provide an explosive fitted to any seam of coal and for both hand and mechanical loading. There is a complete range of velocities and densities and in the list will be found one particularly adapted to your blasting problem.

AMERICAN explosives and AMERICAN electric blasting caps have proved their merits through years of service in representative coal mines. Through well located plants and distributing points prompt delivery service is assured.

NON-GELATINOUS

FAST	MEDIUM	SLOW
American 22	American 11	American 1
American 23	American 12	American 2
American 24	American 12A	American 3
American 25	American 14	American 4
American 26	American 14A	American 5
Genite A	Burton A	American 112

GELATINOUS

Permigel 1
Permigel 2A
Permigel 3

• Capable field engineers are available at your call.

American Cyanamid & Chemical Corporation



30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

EXPLOSIVES DEPARTMENT

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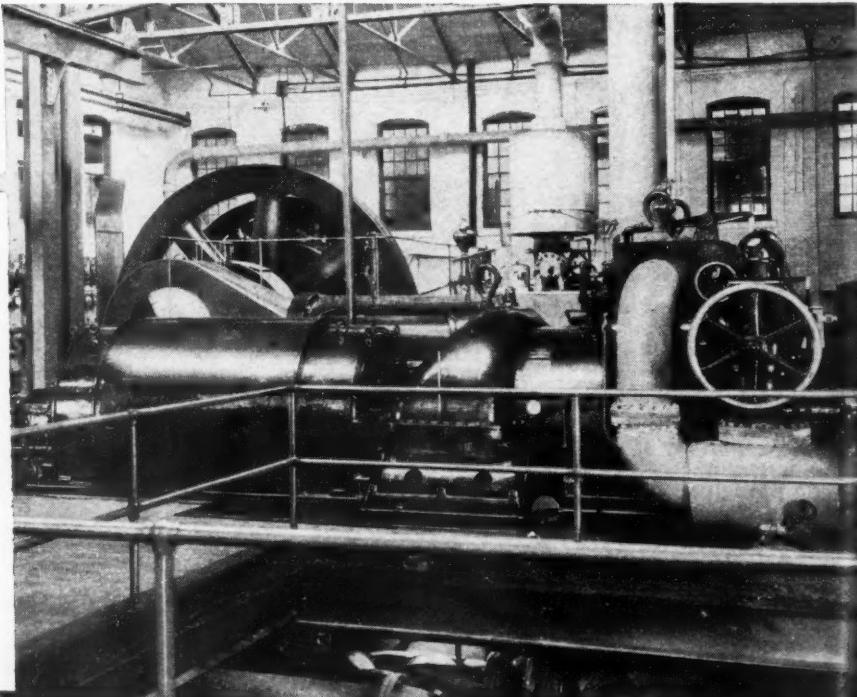
Official U. S. Army Signal Corps Photograph

AIR ALERT over there relies on alertness here! To keep **STEAM** plant power output equal to wartime demands use . . .

...SINCLAIR STEAM CYLINDER and VALVE OILS.

These oils are suited to high, low, or moderate pressures and temperatures, and varying engine characteristics. They atomize quickly . . . give safe lubrication under all load conditions.

(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)



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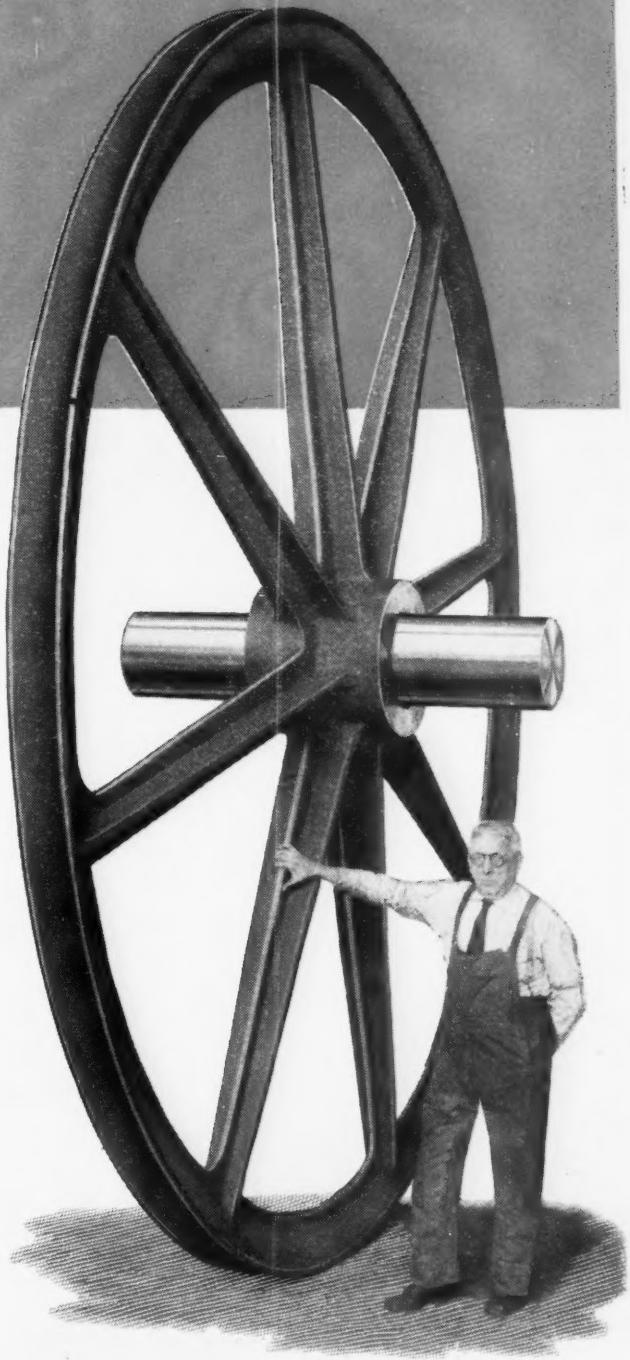
"ALLCASTSTEEL" SHEAVES

PROLONG THE WORKING LIFE OF WIRE ROPE

Widely used, for more than 20 years, by leading mining companies throughout the United States and other countries, Vulcan Allcaststeel Sheaves have thoroughly proved their money-saving superiority for every type of heavy-duty service. Cast in one piece, in our own steel foundry, they are accurately machined AFTER heat-treating to assure permanently accurate alignment.

Besides being extremely tough and strong they are so highly resistant to rope wear that the groove maintains its original correct shape indefinitely—thereby eliminating the destructive grinding and pinching of wire rope so often caused by soft, easily worn, sheaves and GREATLY PROLONGING ITS USEFUL LIFE.

Vulcan Allcaststeel Sheaves are available in any size—for vertical or horizontal mounting—with either plain or anti-friction bearings. Start now, to secure important future savings, by asking our experienced engineers to estimate on replacing your old-style sheaves with rope-preserving Allcaststeel.



VULCAN IRON WORKS

Established 1849

Main Office and Works WILKES-BARRE, PA., New York Office 50 Church

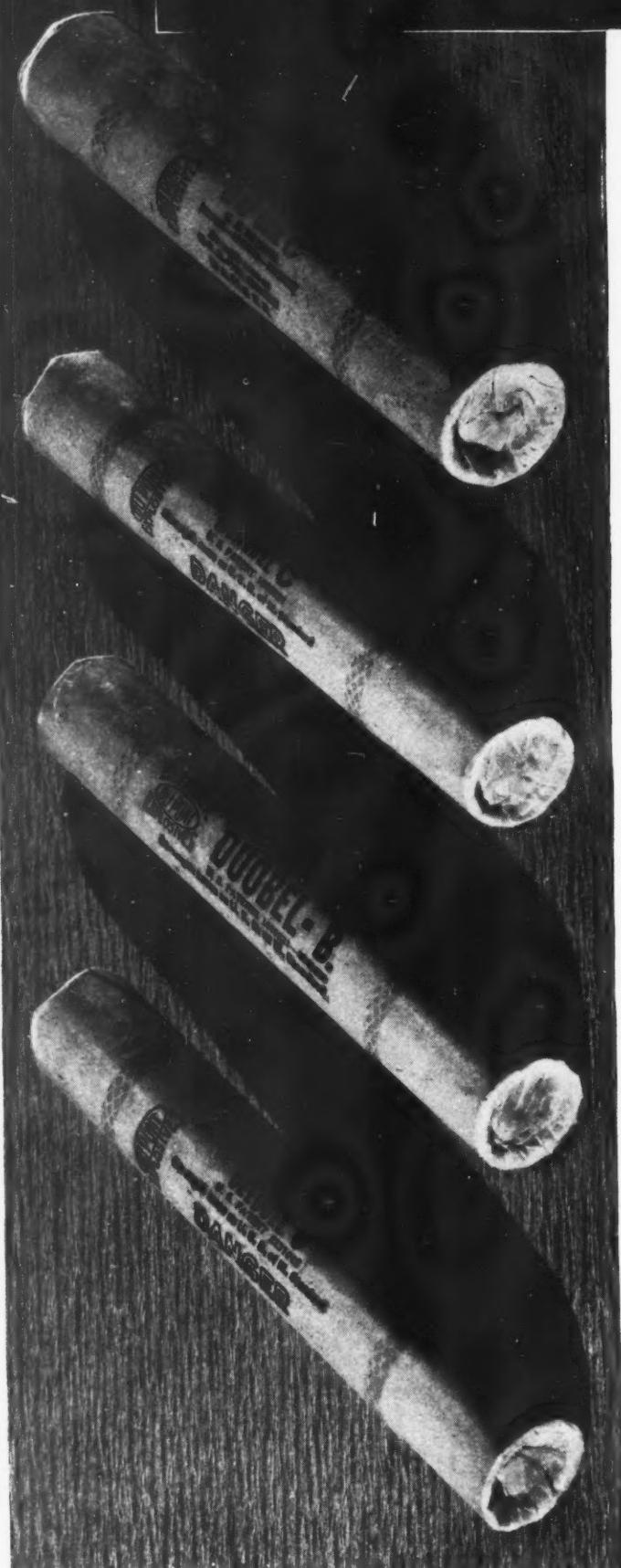
Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Coal-Preparation Equipment

Steam Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Crushing Rolls and Pulverizers
Briquetting Machines
Ball, Rod and Tube Mills

DU PONT PERMISSIBLES



WHATEVER the problem, you'll find a Du Pont permissible in a type and grade especially adapted to meet its requirements. Prove this by checking the list below:

"LUMP COAL" C—an exceptionally low velocity permissible with a wide spreading range. Produces big lump that's easier to load. "Lump Coal" C saves time, labor and materials because fewer drill holes are required. It's the most widely used permissible.

"MONOBEL" SERIES—a series of medium velocity permissibles with slow, heaving actions that bring down a high percentage of coarse coal. "Monobel" C is the most popular of these permissibles.

"DUOBEL" SERIES—these strong, high velocity permissibles give you maximum tonnage per pound of explosives used. Grades A, B and C can be used in moderately wet work.

"GELOBEL" SERIES—for rock work, or coal where water conditions are bad. These are high velocity permissibles but produce a good grade of coal. "Gelobel" C due to its high stick count is most economical to use.

COMPLETE LINE OF DU PONT PERMISSIBLES

Grade	Cartridges per 50 lb 1 1/4" x 8" (a)	Velocity feet per second (b)	Fume Class (c)	Cartridges per 1 1/2 lb 1 1/4" x 8" (d)
"Duobel" A.....	135	9,200	A	4.1
"Duobel" B.....	150	9,000	A	4.5
"Duobel" C.....	165	8,800	A	5.0
"Duobel" D.....	185	8,400	A	5.6
"Duobel" E.....	205	8,000	A	6.2
"Duobel" F.....	225	7,400	B	6.8
"Duobel" G.....	250	7,100	B	7.5
"Monobel" A.....	135	7,000	A	4.1
"Monobel" B.....	150	6,400	A	4.5
"Monobel" C.....	165	6,200	A	5.0
"Monobel" D.....	185	6,100	B	5.6
"Monobel" E.....	205	6,000	B	6.2
"Lump Coal" C.....	118 (e)	5,000	A	3.5 (e)
"Lump Coal" CC.....	165	5,500	A	5.0
"Gelobel" A.....	96	14,000	A	2.9
"Gelobel" B.....	108	11,500	A	3.2
"Gelobel" C.....	120	11,500	A	3.6

(a) 3% allowable variation. (b) unconfined. (c) Bureau of Mines data
(d) charge limit. (e) not made in less than 1 1/2" diameter
118 cartridges 1 1/4" x 8"; 115 cartridges 1 1/4" x 6"

Whenever you have an explosives problem, feel free to consult a Du Pont representative, or write E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Del.



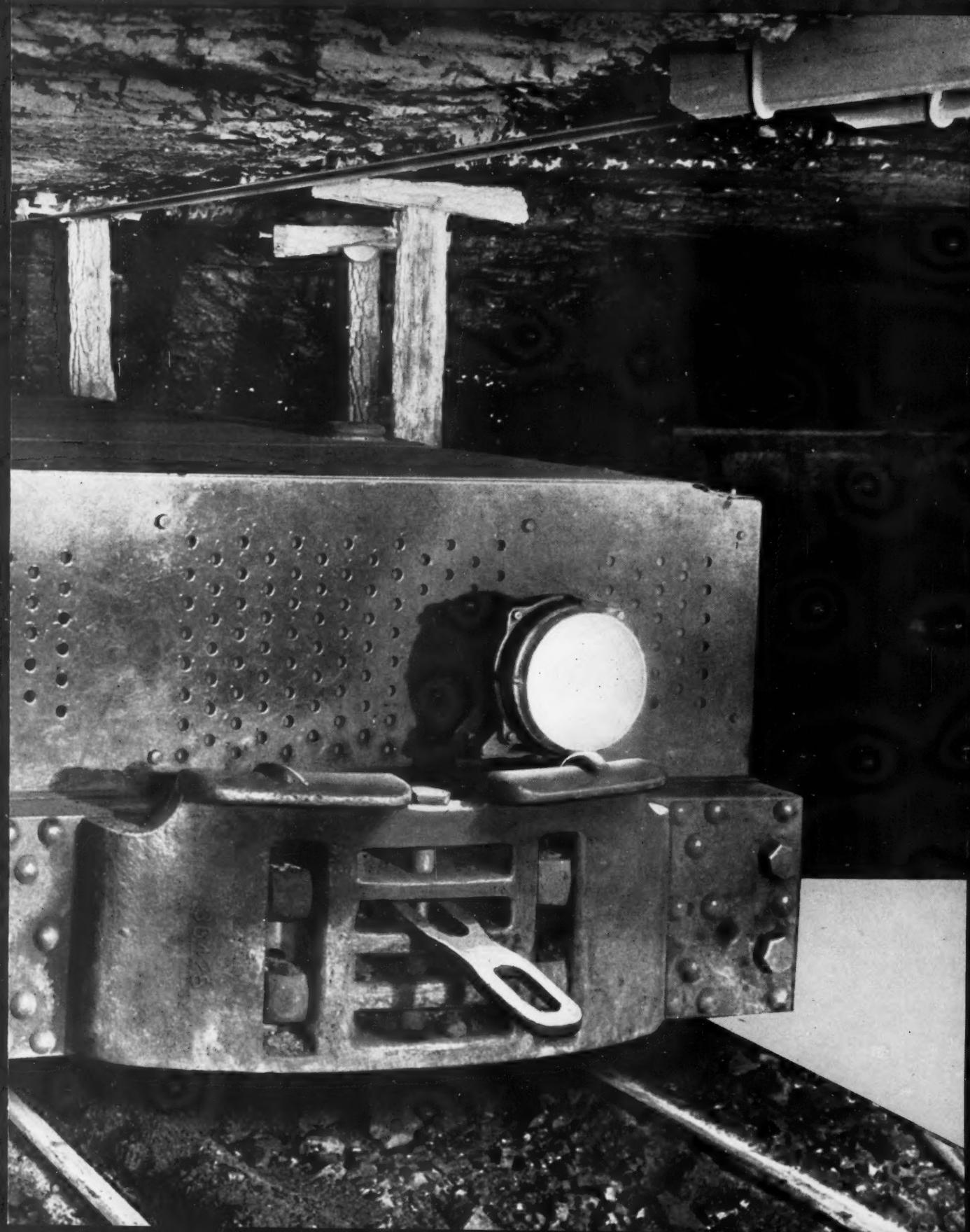
Jeffrey Locomotives

For over sixty-five years, Jeffrey locomotives have been speeding mine transportation. There is a type and size for every requirement and condition in coal and metal mining. Jeffrey mining engineers have made a special study of mine locomotive use and adaptation... they will be glad to pass this experience on to you.

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COAL AGE

COMOTIVES



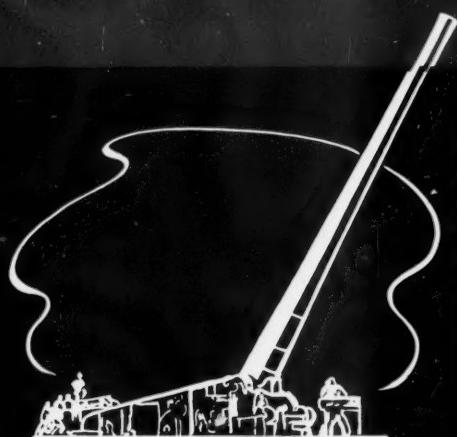




COAL and TRANSPORTATION

OVER 80% OF THE FUEL REQUIREMENTS
OF CLASS 1 RAILROADS EXCLUSIVE OF
ELECTRIC POWER IS SUPPLIED BY
COAL

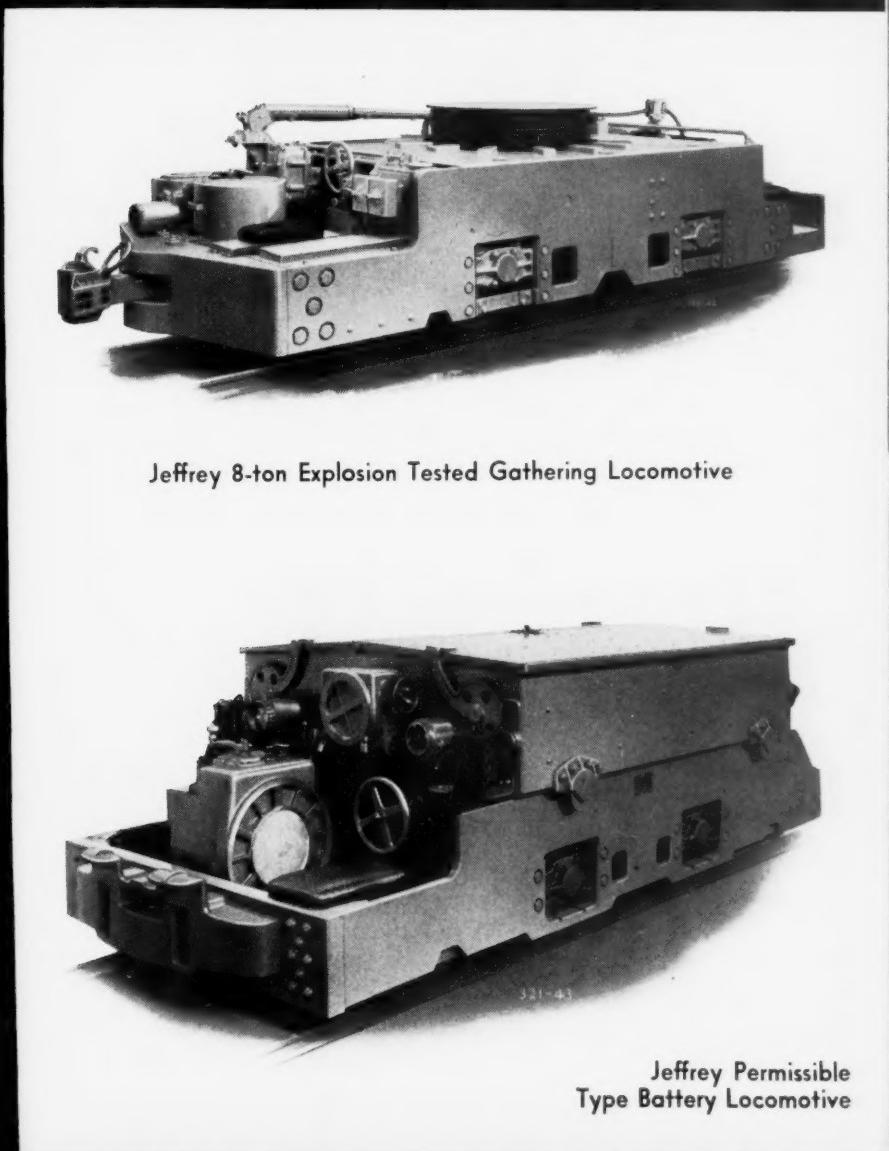
A JEFFREY LOCOMOTIVE FOR EVERY TYPE OF MINE SERVICE



IT TAKES 150 TONS
OF COAL TO PRODUCE
THE STEEL FOR
ONE 16-INCH
GUN



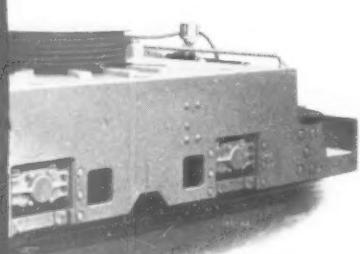
BUY
WAR
BONDS



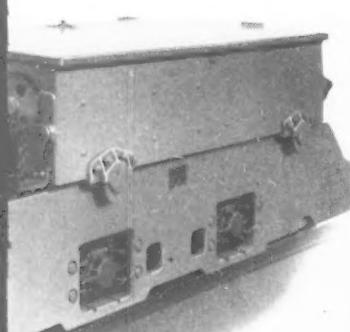
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ENTS
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BY

OTIVE
SERVICE



Gathering Locomotive



Jeffrey Permissible
Type Battery Locomotive

Jeffrey

SERVES THE INDUSTRY
BELOW AND ABOVE GROUND
FROM FACE TO RAILROAD CAR

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LOADERS
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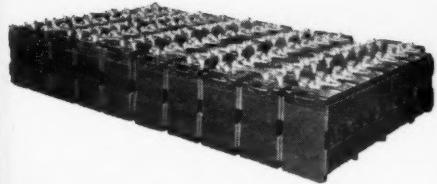
Jeffrey Mfg. Co., Ltd.
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British Jeffrey-Diamond, Ltd.
Watfield, England

Jeffrey-Galion (Pty), Ltd.
Johannesburg, S. A.



THESE STORAGE BATTERIES ARE *VETERANS* OF TWO WARS



*A Report on Conservation for Users
of Mine Locomotives and Shuttle Cars*

ADVANTAGES OF THE EDISON ALKALINE BATTERY IN MINE LOCOMOTIVES AND SHUTTLE CARS

- ★ It is durable mechanically. High strength steel construction is used in the containers, grids, pole pieces, etc. The electrolyte is a preservative of steel.
- ★ It is foolproof electrically. It may be accidentally short-circuited, over-charged, over-discharged, or even charged in the reverse direction without injury.
- ★ It can be charged rapidly. It does not require critical adjustment of charge rates and, therefore, can be charged directly from the d-c mine power supply. It has no finish-rate limitations. It requires no equalizing.
- ★ It withstands temperature extremes. It is not damaged by freezing. Free air spaces on all sides of all cells provide ventilation for rapid cooling under high temperature conditions.
- ★ It is simple to maintain. Merely charge adequately, add pure water, keep clean and dry.
- ★ Its tray assembly and cell connections are extremely simple.
- ★ Its life is so long that its annual depreciation cost is lower than that of any other type of storage battery.

During World War I, a New England plant installed a fleet of battery industrial trucks each provided with two Edison Alkaline Batteries, one to operate the truck while the other was on charge. The trucks worked around the clock on war production, but after the Armistice the plant went to an 8-hour day so that one battery per truck was enough and the spare batteries were not needed. They were put into storage and there most of them remained until the outbreak of the present war.

Now they are again in service. In spite of the fact that most of them stood idle for nearly a quarter of a century, they are doing a completely satisfactory job keeping the trucks supplied with power. In fact, shortly after the outbreak of the present war, the plant purchased a new truck without a battery because its reserve stock of spare batteries was still ample.

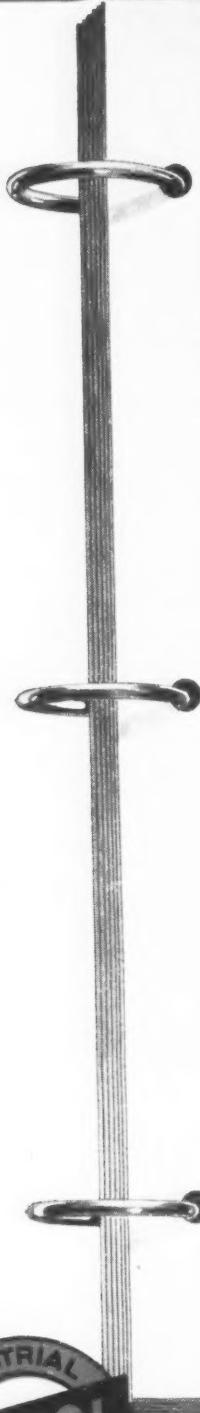
The current performance of these veterans of two wars is living testimony to the extra reserve dependability in the Edison Alkaline Battery. Some of the unique characteristics which account for this dependability are cited in the column at the left.

EDISON STORAGE BATTERY DIVISION, THOMAS A. EDISON, INCORPORATED, WEST ORANGE, NEW JERSEY

Edison
ALKALINE BATTERIES

* COLOR

TIDE WATER LUBRICANIA



DEFINITION: For practical purposes, the color of an oil is expressed as a "number" which is determined by matching the light transmitted through a pre-determined depth of oil with that same light transmitted through numbered and standardized glasses or disks.

EXPLANATION OF TESTS USED: The American Society for Testing Materials have selected two instruments for determining the color of petroleum products. These instruments are:

- (1) The **Saybolt Chromometer** for making color determinations on the lighter oils.
- (2) The **Union Colorimeter** for determining color on the "pale-straw" and darker products.

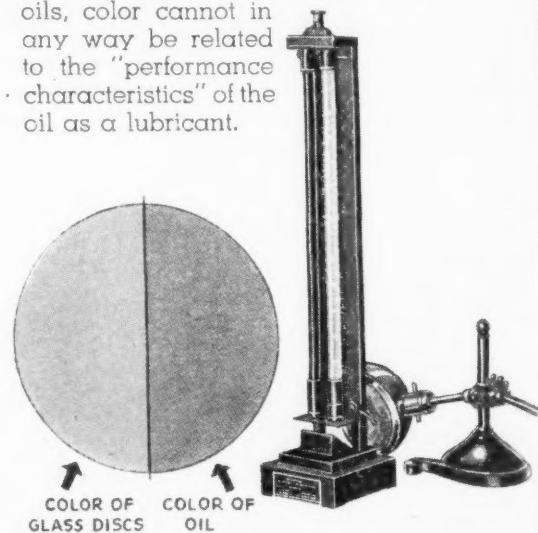
THE SAYBOLT CHROMOMETER consists of two vertical glass tubes. One of these tubes is of plain glass, open at both ends with provision for holding one or two colored glasses or disks at the lower end. The other tube is closed at the lower end with a colorless plate and is provided with a drain cock. This tube is graduated. A mirror reflects light through the oil and the tubes into an optical prism-eye piece for matching the light passing through the oil with the light passing through the disks. The color scale for light oils varies from minus 16 to plus 30.

THE UNION COLORIMETER: In the Union Colorimeter the N.P.A. or A.S.T.M. color of the oil is obtained by matching one of a series of fixed color standards against a sample of oil. The comparison is observed through a circular aper-

ture at the end of a long rectangular box. The color standards are mounted at one end of the box in a vertical magazine which may be moved up and down by means of a knurled hand knob operating a ratchet and gear.

The method used for matching colors on both the Saybolt Chromometer and the Union Colorimeter follow a carefully prescribed procedure outlined under A.S.T.M. Designations D156-38 and D155-39T respectively.

SIGNIFICANCE: Color is of importance in the case of certain light petroleum fractions, particularly products used in dry cleaning or in the textile industry, where the use of colored products might discolor the fabric being treated. The chief significance of color as applied to the darker oils is in the fact that it is a generally accepted index of the uniformity of a given grade or brand. In these oils, color cannot in any way be related to the "performance characteristics" of the oil as a lubricant.



DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

SCIENTIFICALLY ENGINEERED
FOR EVERY INDUSTRIAL USE

TYCOL

* This is the 8th of a series of informative messages concerning the meaning and significance of commonly used tests and terms employed to describe the characteristics of lubricating oils.



All Tycol oils and greases are subject to rigid tests to control the uniform quality of manufacturing. They are manufactured in a comprehensive line so as to meet every specific operating require-

ment. It is the combination of the unvarying high quality of Tycol products and the scope of the line that makes possible the unexcelled performance of Tycol lubricants for Industry.

TIDE WATER ASSOCIATED OIL COMPANY

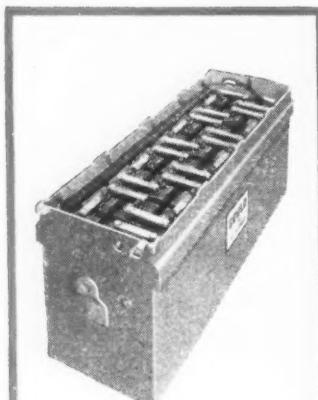
MAKERS OF THE FAMOUS VEEDOL MOTOR OIL • Eastern Division: 17 Battery Place, New York 4, N. Y.
Principal Branch Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.

INDUSTRIAL LUBRICANTS



GOULD locks the door to ESCAPING ACTIVE MATERIALS

Call Gould
TO SOLVE
YOUR BATTERY PROBLEMS



Rated conservatively . . .
Goulds equal or exceed
in capacity any battery
of comparable size and
cell structure.

Are you receiving the
monthly informative
"Gould Battery News"?
If not . . . ask for it.

The life of a storage battery depends upon the length of time the active material is retained within its grids. For years shedding, the loss of power producing active material from the grids, caused premature failure, and it was not until Gould pioneered the spun glass mat for American battery users that ordinary battery life was greatly increased.

Made to a formula that is still exclusive with Gould, these spun glass mats are placed on each side of every positive plate. Here, after a few months of service, they actually become a part of the plate, positively locking the active material in place.

This fusion prevents loss of power through electrical and mechanical abuses, such as improper charging and rough handling. It also permits a freer circulation of the electrolyte to the plate surface and thereby provides still another reason for Gould's higher sustained capacity.

Get the facts on Gould Batteries. Ask for Gould Kathanode Bulletin, using business letter-head.

GOULD STORAGE BATTERY CORP.
DEPEW, N. Y. • Factories at Depew, N. Y. • North Bergen, N. J.
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FOR EXCELLENCE IN STORAGE BATTERY PRODUCTION AT DEPEW PLANT



GOULD

Since 1898 THE BATTERY PICKED BY ENGINEERS

SELF DISCHARGE

*One of a series of service suggestions
for users of industrial batteries.*

Self discharge is the tendency of a battery to lose power during the period when it is not in active service. It is primarily dependent upon the type of plates used, although the purity of the electrolyte can be a contributing factor.

There are two general types of lead cell batteries. In industrial trucks, Diesel starting, automotive and other uses, where the emphasis of design is on light weight, small bulk and high capacity, batteries with pasted plates are almost universal. In the better stationary installations, where neither weight or bulk represents a serious problem, solid lead or Plante type plates are favored.

With the latter type, particularly when the positive plates are made entirely of pure lead, as in the Gould Plante, self discharge is not an important matter. However, in pasted plate batteries which employ grid frameworks to hold the active material in place, it becomes a serious problem. This is especially true if the battery must stand idle for any great length of time.

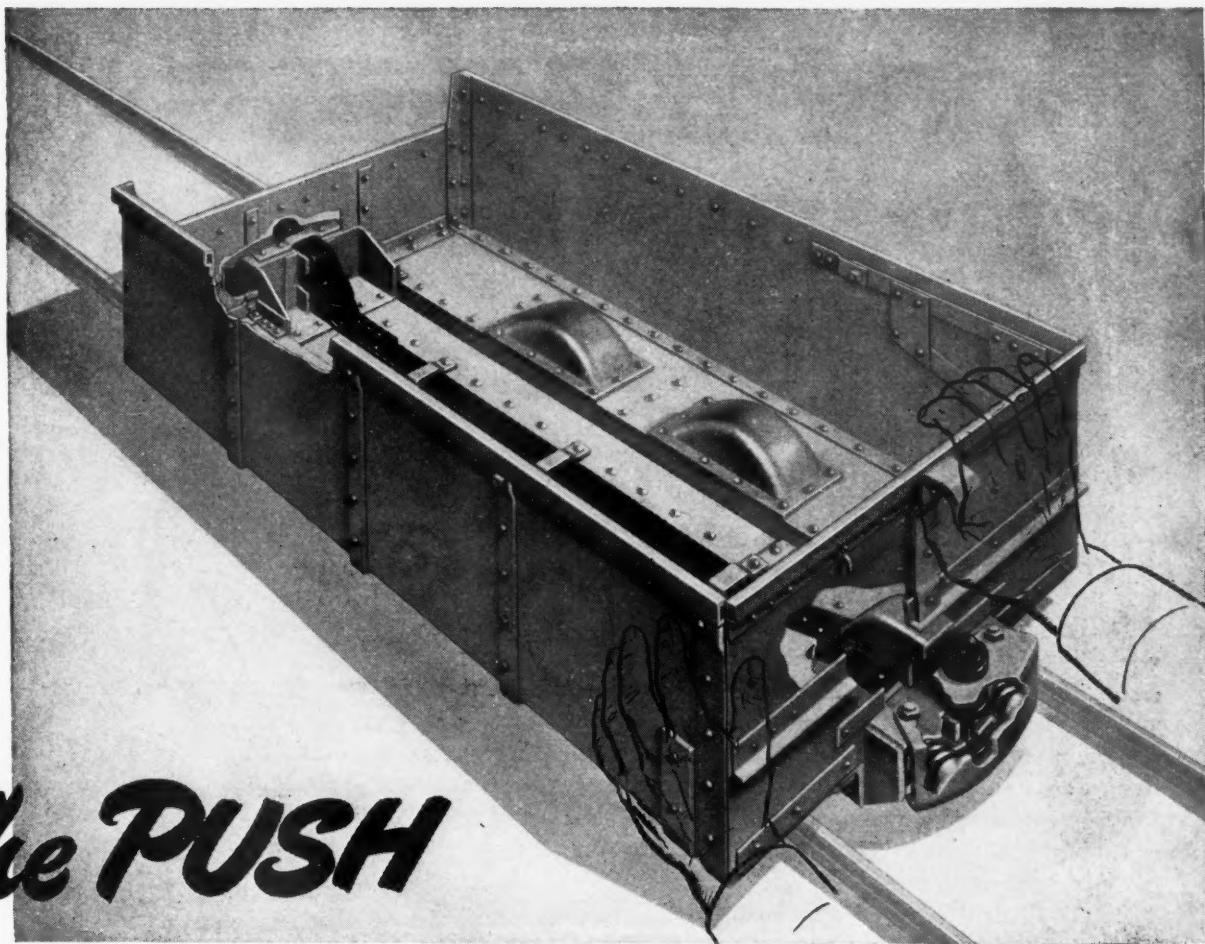
Antimony is the secondary metal commonly alloyed with lead to give grids the necessary strength to hold active material in place. During charging operations, a small amount of this antimony usually dissolves from the positives and is plated on the sponge lead of the negatives. There it sets up a local action that causes the plates to discharge slowly.

All lead batteries will discharge when standing idle. They discharge faster when warm than cold and this loss is greater in an old battery than in a new one. This discharge on a good, fully-charged unit approximates the following specific gravity readings:

at 100° F.—.003 S.G. per day
at 80° F.—.002 S.G. per day
at 50° F.—.0005 S.G. per day

If self discharge materially exceeds these rates a Gould service man should be called in.

Normally self discharge is not important to battery users who cycle their equipment frequently. However, it represents a big factor when selecting a battery for floating installations. The Gould Plante is preferred for this service by many engineers because its positive plates are of one piece pure lead construction, that contains no antimony.



The PUSH That saves the car

Here is a new mine car that escapes a large part of the wear and tear that the conventional mine car encounters. The rugged new Bethlehem Mine Car gives longer service with less maintenance, fewer repairs, thanks to its floating drawbar.

By the action of this sturdy steel member, running free from end to end inside the car, the pull of the locomotive becomes more like a PUSH from the rear than a PULL from the front.

The advantages are obvious. Because the floating drawbar transmits the pull, as well as shocks, to the draft springs at the rear of the car, the ends of the Bethlehem Mine Car can never pull apart, and the car stands up better in hard service. In a train of cars, there is no strain on any one car; the pull is transmitted directly from one drawbar to the next.

Moreover, the draft springs of the Bethlehem Mine Car are located outside the car, protected by a housing which practically eliminates danger of spring failure resulting from corrosive action of coal.

Investigate the new Bethlehem Mine Car into the floating drawbar. We shall be glad to give you more details. Get in touch with the nearest Bethlehem representative, or write direct to Bethlehem Steel Company, Bethlehem, Pa.

OTHER BETHLEHEM PRODUCTS FOR TODAY'S HIGH PRESSURE MINE PRODUCTION:

STEEL TIRES	WIRE ROPE
MINE TRACK EQUIPMENT	
MINE CAR WHEELS AND AXLES	
BOLTS, NUTS, SPIKES	STEEL PIPE
STEEL TIMBERING	
SUPERIOR HOLLOW DRILL STEEL	

BUY MORE WAR BONDS



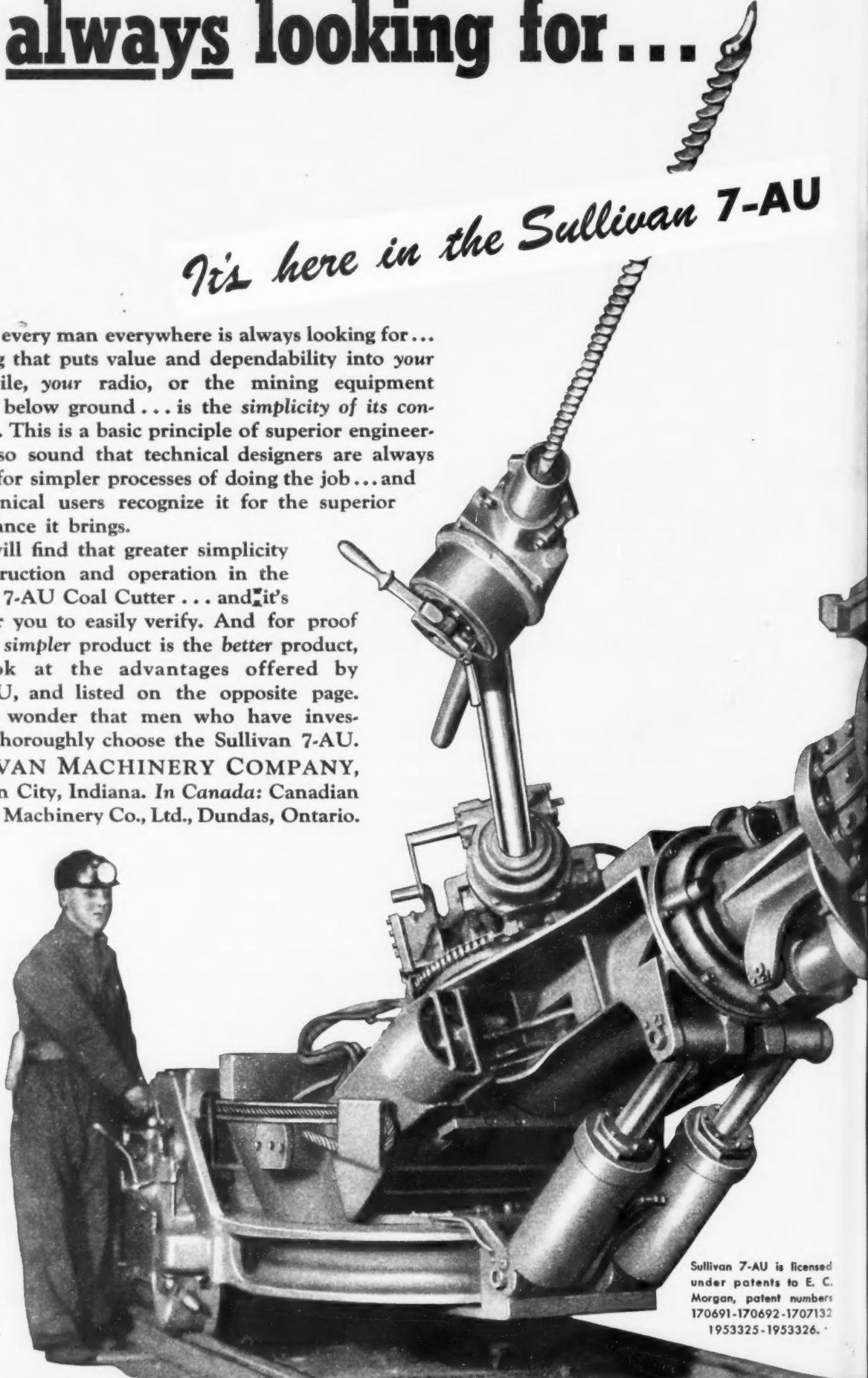
What every man everywhere is always looking for . . .

It's here in the Sullivan 7-AU

• What every man everywhere is always looking for... the thing that puts value and dependability into your automobile, your radio, or the mining equipment you use below ground . . . is the *simplicity* of its construction. This is a basic principle of superior engineering . . . so sound that technical designers are always looking for simpler processes of doing the job . . . and non-technical users recognize it for the superior performance it brings.

You will find that greater simplicity of construction and operation in the Sullivan 7-AU Coal Cutter . . . and it's there for you to easily verify. And for proof that the simpler product is the better product, just look at the advantages offered by the 7-AU, and listed on the opposite page. It is no wonder that men who have investigated thoroughly choose the Sullivan 7-AU.

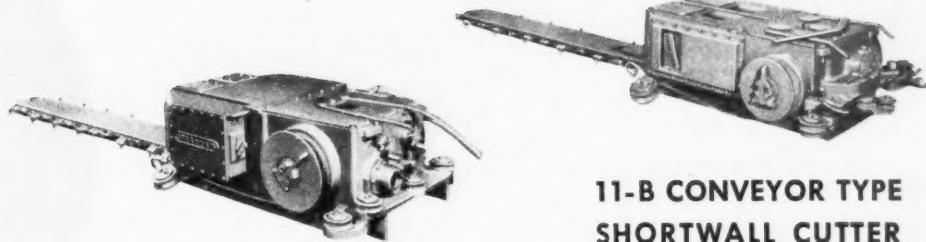
SULLIVAN MACHINERY COMPANY,
Michigan City, Indiana. In Canada: Canadian
Sullivan Machinery Co., Ltd., Dundas, Ontario.



Sullivan 7-AU is licensed under patents to E. C. Morgan, patent numbers 170691-170692-1707132 1953325-1953326.



- ★ Simple Construction with Only 20 Gears and 6 Hydraulic Valve-Levers.
- ★ Horizontal Cutting Range with Hydraulic Cylinder Type Roll, 41 Feet and 1 Inch.
- ★ Cutting Height from 10 Inches Below Rail to 8 Feet 6 Inches Above.
- ★ Shears Parallel Cuts 21 Feet 8 Inches Apart.
- ★ 2 Cuts with One Laying of Track.
- ★ Cuts and Shears Room Necks without the Laying of Turnout Switches.
- ★ Cuts Over Large Amounts of Broken-Down Draw Slate.



7-B SHORTWALL CUTTER

A fast cutter that stays well ahead of the loader. For modern mechanized mining. Handles up to 9-foot bar. Two-direction operation. Variable feed control for hard cutting or worn bits. Easy to handle. Durable—has splash lubrication, alloy steel gears and pinions, 50 h. p. slow speed motor. Superior, through and through construction makes 7-B stay underground longer. All parts easily accessible.



11-B CONVEYOR TYPE SHORTWALL CUTTER

21" high, cutting a 6" kerf yet it delivers cuttings to the rear. 58 inches long, 20, 35 or 50 h.p. Tough, speedy, easy to move and position. Fool proof, convenient operation. Simple controls handled from rear or side. Rugged, accessible construction. Splash lubrication. Anti-friction bearings, alloy steel gears and pinions. Big-load starting motor.

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Coal Mining Machines • Scraper Haulers • Rock Loaders • Hoists
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NOTES TO DRILLERS and Shot-Firers

On How to Get the Most from Permissibles



1 Check the Sights:

You can get rib holes that grip or lift too much if the sights are not carefully checked before marking the location and direction in which the holes are to be drilled.

2 Pitch Holes Slightly Upward:

Water drains out of holes that pitch slightly upward. Especially important where the holes are drilled some time before the face is shot.

3 Don't Drill Places Before They're Cut:

It's easy to drill too deep, or not deep enough, when the holes are drilled before the cut is made. It's important that the holes be kept at least 4" (the average is 8"-12") from the back of the cut.

Atlas Representatives are aiding customers everywhere in getting those "2 + 2 = 5" results that come when synergistic* thinking is applied to blasting problems.

By studying the structure of the formation, by a back-and-forth exchange of ideas with the customer, they are enabled to put a finger on the *one* blasting formula and the *one* permissible that will produce better-than-anticipated breakage.

Let our Representatives try synergistic thinking with you on YOUR blasting problems. Consult Atlas.

***Synergism:** *The force that produces a "2 + 2 = 5" result when both you and we get together and really "click."*

ATLAS EXPLOSIVES
"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

Tomorrow's Mines will MODERNIZE *Electrically*

MAINTAINED VOLTAGE AT THE FACE MEANS MORE COAL . . .

PROPER USE of ample electric power has a lot to offer to the mines of tomorrow. And certainly, among the first steps will be the provision for maintenance of desired voltage at the working face.

Many a mine, operating at wartime capacity with prewar wiring, has encountered all of the problems of lowered voltage at the face. Sluggish or even burned out machinery—slowed production—skyrocketing costs.

Everyone knows the answers. First, if possible, relocate the substation closer to the work. Provide positive conductors of ample size and capacity, ample size returns.

When wires and cables for this kind of modernization become available, remember Roebling are *wire specialists*, ready to provide the right conductor for every job...to maintain voltages...to bring you all the benefits of mechanical loading...better pumping, ventilation, and cleaning. And a nearby Roebling wholesaler will serve you from his stock.

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Mine entry cables

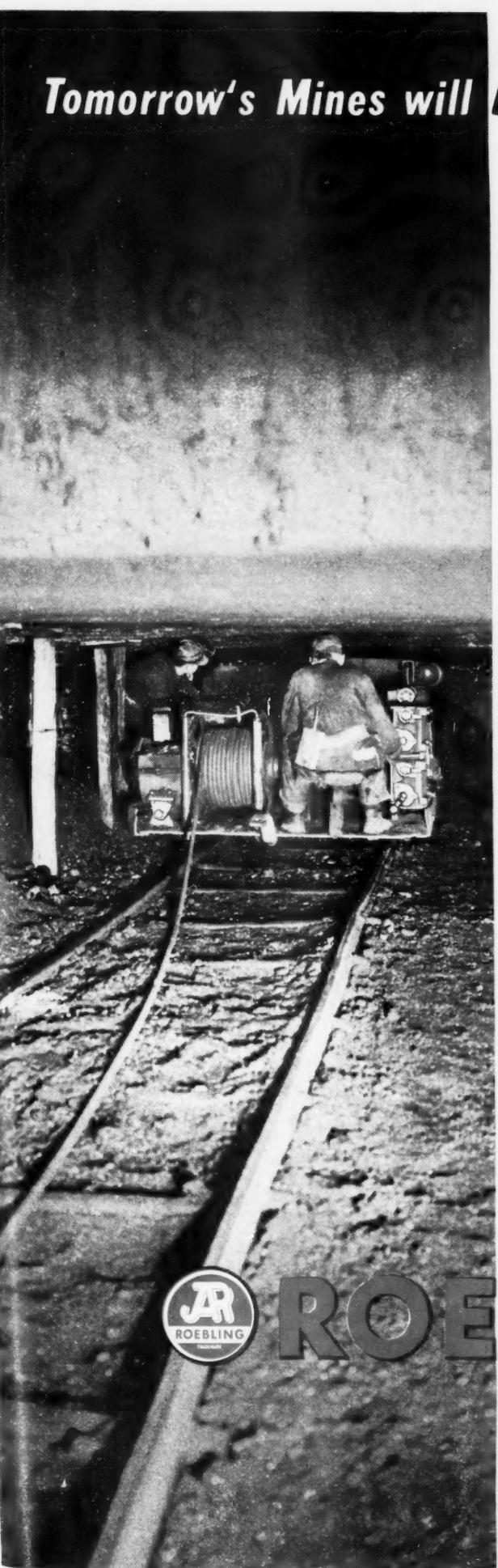
Mining machine cables

For Every Job
....The Right
ROEBLING
Electrical Wire
and Cable

Locomotive reel cables

Bore hole cables

Trolley wires





"We've burned a lot of midnight oil"—says *Romey

"During the rubber famine we have burned a lot of midnight oil developing insulating compounds from the available substitutes.

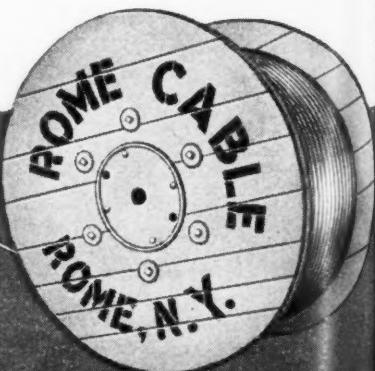
"As a result we are able to offer insulated wires and cables that are safe and satisfactory.

"Even though they do not always meet the test values that were possible when natural rubber was available, they satisfy every practical need and are mighty good for wartime products.

"Give us a little more time and experience and they will be equally as good as rubber."

FROM BAR TO FINISHED WIRE

ROME CABLE
CORPORATION
ROME • NEW YORK



IT'S NOT THE HORSEPOWER— IT'S THE "HAULPOWER"

* You can't judge the performance of a truck by the rated horsepower of its motor . . . especially in strip coal hauling. It's how efficiently the drive system delivers that power from motor to road, that determines HAULPOWER . . . the ability to keep huge loads moving in any weather, under any running conditions, up steep grades.



The Walter Four-Point Positive Drive transforms engine Horsepower into tremendous truck "Haulpower". This exclusive drive system supplies positive traction in all FOUR driving wheels, which enables Walter Tractor Trucks to haul up to fifty-ton loads on soft or slippery surfaces, grades or running conditions that stop other trucks. It eliminates wheel spinning that churns up roads and renders conventional trucks helpless.



Three patented Automatic Locking Differentials provide the unfailing 4-wheel traction of Walter Tractor Trucks. Power is proportioned to each wheel according to its traction, putting the most power where it is most needed at all times. Driving force is applied at the most effective point—the wheel rims—by Suspended Double Reduction Drive, which also permits larger gear capacity, higher road clearance, and less unsprung weight. Rugged Tractor Type Transmission (6 speeds forward, 2 reverse) withstands strain and shock of huge loads and difficult running.

Before you buy another truck it will pay you to learn more about these and other features of Walter Tractor Trucks. Write today for literature.

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1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L.I., N.Y.

WALTER
TRACTOR TRUCKS

For Short and Long Hauls...



**EUCLIDS are
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Bet!**



Countless millions of tons of ore, rock and heavy excavation have been hauled with unusual speed and economy by Rear-Dump EUCLIDS. On shuttle operations or long hauls . . . on level stretches or steep grades . . . Euclids have proved their ability to haul larger pay loads faster and more efficiently.

With a speed range from 2 to 24 m.p.h.—eight forward speeds, four backward—and full floating double reduction drive axle, Rear-Dump EUCLIDS meet every requirement of power and speed for long or short hauls. Special controls increase usefulness and efficiency of the unit . . . full unobstructed vision of the

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No matter what your hauling problem may be . . . mine, quarry, highway or general construction . . . Euclids are your best bet for efficient performance and time-proven reliability.

The EUCLID ROAD MACHINERY Co. • • Cleveland, Ohio



EUCLID

SELF-POWERED
HAULING EQUIPMENT
For EARTH . . . ROCK . . . COAL . . . ORE





motors never wear out

MORE WESTINGHOUSE SK MOTORS ARE USED IN COAL MINES THAN ALL OTHER MAKES COMBINED

AMPLE DESIGN—guts to carry the heavy loads—rigid one-piece frame with feet welded to frame to provide rigid integral foundation—uniform magnetic path aids commutation.

SPECIALLY DESIGNED INSULATION—field coils wound on rigid Micarta spool—vacuum-impregnated with hydrolene gum—eliminates air pockets. Mica-insulated armature coils—form-wound on all except the smaller ratings—protect against moisture or dust—prevent electrical breakdown.

EXCLUSIVE WESTINGHOUSE VESTIBULE SEAL—keeps lubricant in—dust and dirt out.

GREATER ACCESSIBILITY—Brushes, brushholders and commutator readily accessible—permits easy brush adjustment or renewal—brushes readily “sanded-in”.

WIDE RANGE OF RATINGS—from 1 to 200 hp to meet every mining requirement.

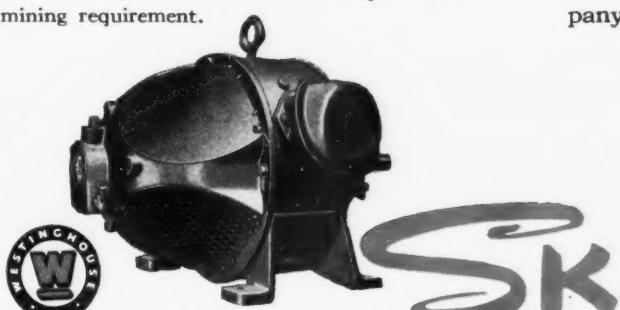
You'll see them wherever you go—old veterans of 10—20—30 years service. SK Motors never seem to wear out. But, of course, they do. Like any other rotating machine, worn parts have to be replaced.

With SK Motors, however, parts can *always* be replaced. It makes no difference whether the motor was installed five years ago or thirty years ago. The basic construction of the Westinghouse SK Motor has never been changed. Parts made today for the latest improved design will fit any SK Motor ever built of the same rating and frame.

The Westinghouse SK Motor has been the standard for the mining industry since 1911. During the past thirty years it has been vastly improved—improvements you get in every new replacement part.

When you standardize on type SK Motors you automatically reduce and greatly simplify your replacement part requirements *and* you get the mining motor that leads all others. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

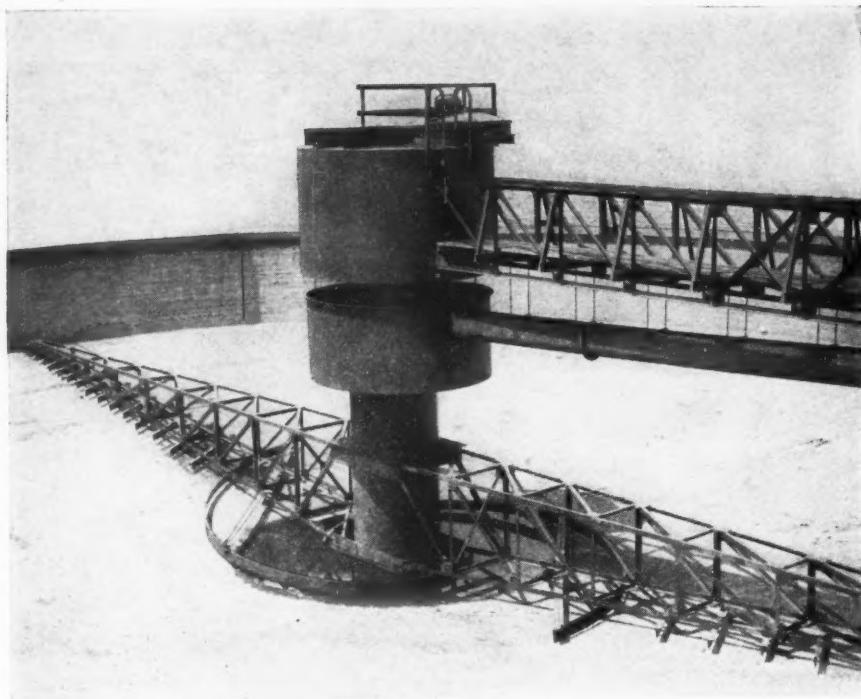
J-21302



Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

MINING MOTORS



"Auto-Raise" Thickeners

HARDINGE EQUIPMENT

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For Reclaiming fine coal and preventing stream pollution.

The toggle type "Auto-Raise" mechanism lifts the entire scraping mechanism above any overload or obstruction in the tank bottom.

A combination of the spiral and segmental scrapers results in a rapid removal of the settled solids.

Recently two 110 ft. diam. center column "Auto-Raise" thickeners were installed for the treatment of blast furnace gas washing water. Each thickener is handling 5000 gal. per min. of water and removing 50 tons per 24 hrs. of solids.

Write for Bulletin 31-C

HARDINGE

COMPANY, INCORPORATED - YORK, PENNSYLVANIA

New York, 122 East 42nd Street Chicago, 205 West Wacker Drive San Francisco, 501 Howard Street Toronto, 200 Bay Street

For "PEAK COAL PRODUCTION IN '44"

use

MORROW

ENGINEERING FACILITIES!

Designers and Builders of Complete

**COAL TIPPLE and
COAL HANDLING
EQUIPMENT**



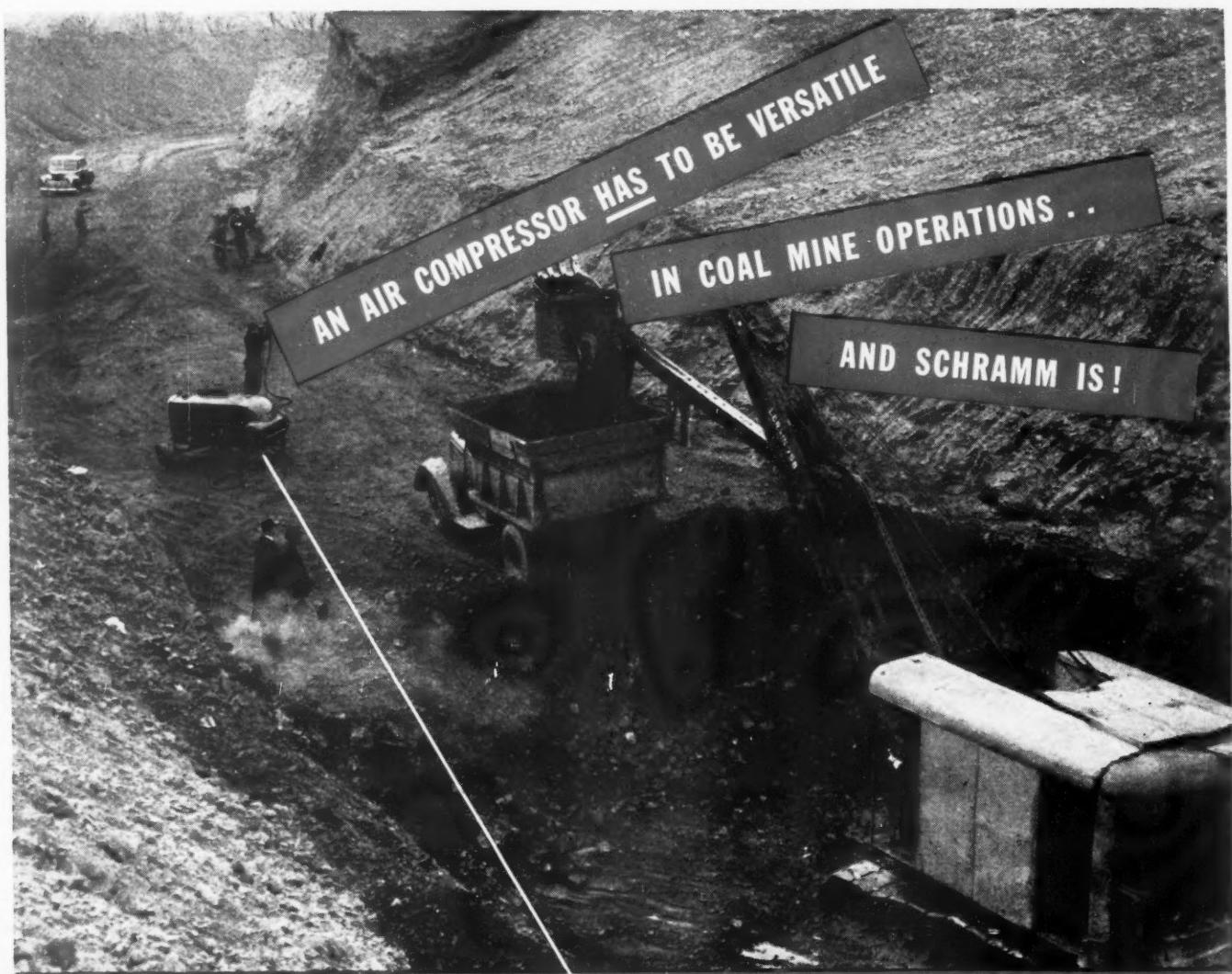
Morrow designed and built equipment—for long lasting economical production.

Complete Operating Coal Tip-
ples . . . Shaking Screens . . .
Coal Washers . . . Car Hauls
. . . Picking Tables . . . Loading
Booms . . . Loading Chutes . . .
Bins . . . Car Retarders . . .
Settling Tanks . . . Grizzlies
. . . Revolving Screens . . . Per-
forated Metal Screens . . .
Flanged Lip Screen Plates . . .
Elevating, Conveying Machinery
. . . Sand, Gravel Screening
and Washing Machinery.

MORROW ENGINEERING—a complete and thoroughly qualified engineering and construction service, used by progressive coal operators everywhere . . . offers undivided responsibility from plan to operation . . . backed by an excellent record of successful experience in designing, building and maintaining dependable, low cost tipple and coal handling equipment.

• MORROW engineers are available for solving your most difficult coal preparation problem, whether it be designing and building a new tipple or checking your present tipple and handling facilities for repairs or replacements with MORROW equipment to provide more profitable "Peak Coal Production in '44."

MORROW
MANUFACTURING CO. • WELLSTON, OHIO
DESIGNERS AND BUILDERS OF COAL
HANDLING EQUIPMENT FOR OVER 25 YEARS



When a coal mine superintendent says, "You can't beat the Schramm Air Compressor we have—it's so versatile!"—it becomes an important statement.

Because, based on a survey by Schramm, Inc., the value of an air compressor in coal mines depends largely on its versatility.

Schramm is so very versatile—can do so many air pressure jobs in and about strip mining and deep mining, it has virtually become a part of the coal mining business . . . just as much as the shovels, tractors or mining cars.

Note these uses for Schramm: rock drilling and boulder breaking—cleaning machinery—sand blasting—metalizing—building shafts—furnishing air for truck tires—blowing dust from electric motors and radiators.

Indeed, wherever air is needed Schramms are usable. They are compact, lightweight, easy to move about on the job—all of which is important because they don't tie up other pieces of machinery or require extra man power.

Schramm, by its versatile performance in the field, has become closely associated with quicker, more efficient coal mining operations. Write today for Bulletin 42-PA describing the mechanical features and savings offered by this versatile compressor. Or, refer to the Coal Mining Catalogs.

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

Red Letter SCHRAMM Features

100% Water Cooled . . .

No freezing in winter, no overheating in summer.

Built as a Unit . . .

Compressor and engine are coupled together as a perfectly aligned, vibrationless unit.

Mechanical Intake . . .

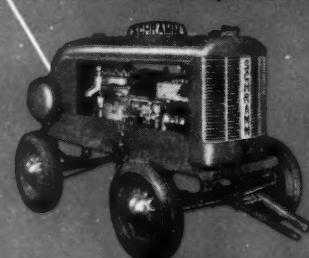
Valves operate from cam in perfect timing with crankshaft and piston travel.

Built-in Electric Starting . . .

No cranking, no injuries, and air in a minute . . . just touching the button puts your men and tools to work at once.

Larger Discharge . . .

Entire area of piston heads is devoted to one big discharge valve for each cylinder. Bigger area combined with lower lift adds to both efficiency and useful life.





Only nine lives? Phooey!

Nine lives are nothing to Harcote. For there's no limit to the number of times Harcote can give new life to wearing parts. And now, with repair parts so difficult to obtain, Harcote is doing it every day, as the No. 1 best bet to keep machines on the job, producing for Victory.

For hard-surfacing parts subject to wear and abrasion, Harcote is the ideal electrode. Its deposited metal has moderate work-hardening properties and "as welded" has a hardness of approximately 50 Rockwell "C".

Use Harcote for welding on carbon steel, low alloy and high manganese surfaces. See your P&H representative for information and procedures, or write us.



The P&H line of Alloy Electrodes is complete. It covers all needs for hard surfacing, resistance to wear, impact and abrasion, for welding stainless steels, 4-6% chrome steels, armor plate, etc. Send for literature.

P&H also builds a complete line of A.C. and D.C. Arc Welders. Write for full information. Early deliveries possible.

General Offices and Factory:
4540 West National Avenue, Milwaukee 14, Wis.

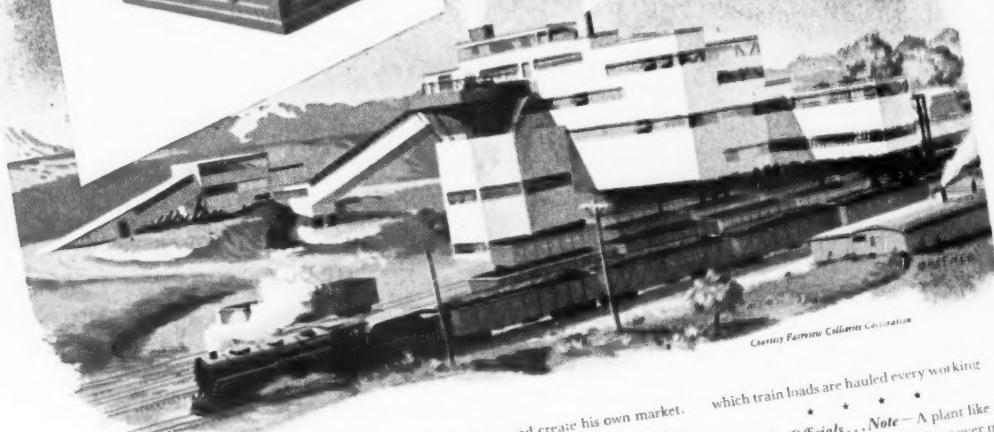


Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.

THIS COAL MINE EXECUTIVE HAD



a profit-making idea!



Courtesy Fairview Coalition Corporation

ACRE AFTER ACRE of perfectly good coal right on the edge of a waiting market . . . but in its raw state or hand picked, the mine president knew it would not stand a ghost of a show with nearby competition.

A 54-inch vein of coal with limited overburden was ideal for development. He knew from pilot tests that the impurities were not prohibitive but, nevertheless, too far out of line to compete. His profit-making idea was to erect a plant to mechanically remove the incom-

bustible impurities and create his own market.

Mechanically Prepared Coal Brings Premium Prices—In consultation with McNally Pittsburg engineers it was estimated that at a cost of only a few cents per ton for mechanical preparation the coal would be superior to other nearby coals. In fact, it would be elevated to a premium price class for which there is an unsatisfied and growing demand. The plant was built to produce 700 tons per hour. Today it is running at 900 tons per hour, and two railroads have spurs from

which train loads are hauled every working day.

* * * * *

Operating Officials... Note—A plant like this will (1) reduce your labor many times over manual picking up to 7" sizes. (2) reduce your labor problems. (3) eliminate customer criticism of dirty coal. (4) lower your production cost. (5) enhance the quality of your product.

Now is the time to prepare for peacetime operation when competition for specification coal will be keen. Call us for consultation.

McNALLY & PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans. • 307 N. Michigan Ave., Chicago 1, Ill. • Koppers Bldg., Pittsburgh 19, Pa. • Caixa Postal 1310, Rio de Janeiro, Brazil

*without Production Men
behind it...
would fall flat!*

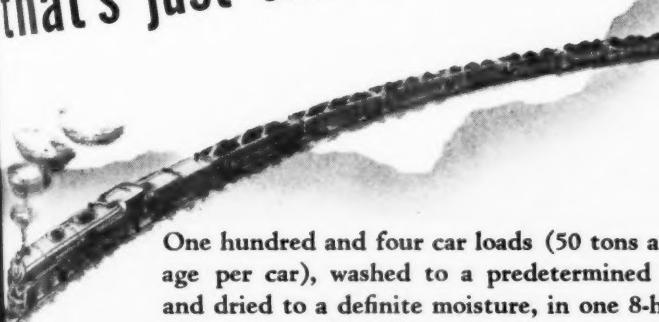
The mine superintendent always wanted a preparation plant and had recommended it for years. He knew that with a plant he could create his own markets and stay in them. Naturally, when he was called in to help decide on the plant, he knew how he could make it pay.

Opportunity is Right at Hand! Many mine officials have plans under way now for preparation plants. Others need more facts. To inform every mining executive how to cash in, McNally Pittsburg extends informative advertising in a new series in Fortune Magazine. The first advertisement is reproduced above. Read on the next page how the profit-making idea worked out.



CARDS Coal Today -

But look what really happens—
a whole trainload of coal
that's just exactly right!



One hundred and four car loads (50 tons average per car), washed to a predetermined ash and dried to a definite moisture, in one 8-hour shift . . . a carload every 4½ minutes!

The picture above is an actual photograph of the loading control booth with the operator's daily record chalked up for all to see. Sizes 6" x 0" are washed in 3 McNally-Norton Washers, and sizes 1½" x 0" are dried in 3 McNally-Vissac Dryers. Total preparation cost is only a few cents a ton . . . besides the plant reduces

your labor many times over manual picking up to 7" sizes. It eliminates customer criticism of dirty coal.

Small Operating Crew. Including all workers—even chemist, sampler, and foremen, turn out these record runs. The equipment is synchronized so perfectly that when the power is turned on all units start functioning automatically. Coal is completely sized, graded, washed, and automatically loaded in railroad cars, controlled by car retarders and ridden by car droppers to the loaded car yard.

When can our engineers discuss with you what a preparation plant will do for you?

M'C NALLY  **PITTSBURG**

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburgh Manufacturing Corporation, 307 N. Michigan Ave., Chicago 1, Ill.
Pittsburg, Kansas • Koppers Bldg., Pittsburgh 19, Pa. • Caixa Postal 1310, Rio de Janeiro, Brazil

Ready Now!

NEW 1944 CATALOG and WIRE ROPE BUYERS' GUIDE

Replaces ALL other catalogs

Changes in wire rope strengths, sizes, grades makes this new catalog a necessity to anyone specifying, using, and buying wire rope.

Information contained in the new 1944 Guide will save you delay in purchasing of wire rope, as well as help you conserve (through proper maintenance) your present wire rope.

Designed, Written for Wire Rope Users

Every wire rope user who needs a catalog for reference should have this one. It will help you on the job. This is no ordinary manufacturer's catalog. It is designed and written for the wire rope consumer.

*Ask for your
copy of Catalog G-15*

No Charge, simply write your request on company letterhead and mail to Macwhyte Company, or any of our distributors and mill depots near you.

NO. 708

MACWHYTE COMPANY

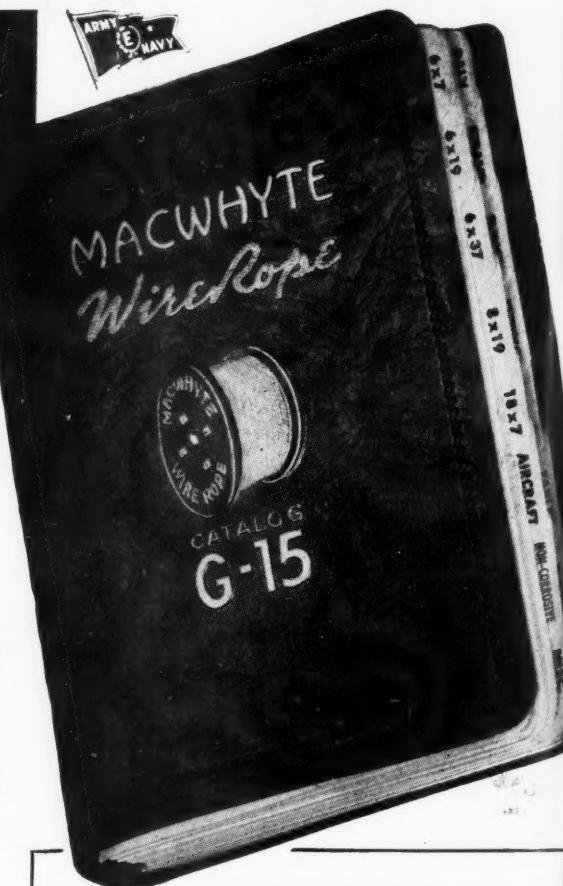
Wire Rope Manufacturers

2931 Fourteenth Avenue, Kenosha, Wisconsin

Mill Depots: New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle • San Francisco
Distributors throughout the U. S. A.

MACWHYTE PREformed and Internally
Lubricated Wire Rope
MONARCH WHYTE STRAND Wire Rope

MACWHYTE Special Traction Elevator Rope
MACWHYTE Braided Wire Rope Slings
MACWHYTE Aircraft Cables and Tie-Rods



NEW TYPE GUIDE... Many New Features!

Inside the covers of this 160 page BUYERS' GUIDE are all the facts and figures you'd expect to find about wire rope, PLUS many that will surprise you. And it's completely indexed with visual tabs for quick reference. Here are only a few of many features:

- ★ All information in accordance with NEW wire rope simplification plan
- ★ Tabular index for split-second reference
- ★ Handy pocket and desk size (4½ x 6½)
- ★ Special binding. Pages lay flat when opened
- ★ Special information on lubrication of wire ropes
- ★ Wire rope constructions
- ★ Slings
- ★ How to order wire rope
- ★ Working loads, safety factors, sheave and drum tolerances, reeling and unreeling, how to seize ropes, etc.
- ★ 90 pages of practical data on use and care of wire rope
- ★ Discount tables
- ★ Glossary of wire rope terms in daily use
- ★ 16 sections, each with quick tab index
- ★ Complete index to each section printed on each tab index, plus a complete index in back of book, plus a special feature, "YOUR INDEX."

*When you buy wire rope
be sure to specify*

MACWHYTE
PREformed WIRE ROPE

Here's something you should know—before you buy a loader!



★ If you want a mechanical loader that will load all your coal, regardless of size, as the loader finds it, you should consider the "Automat", and here are a few reasons why.

The "Automat" is the only loader that will load—in its stride—any lump of coal that will pass through your tipple or any lump of rock your cars, aerial tram or larry, can take. There's no bottleneck in the Whaley "Automat" from its broad shovel to its parallel lift discharge conveyor. No batting around or breakage of lumps by arms, chain lugs or dragging mechanism . . . the "Automat" loads the material just as it finds it. The loading mechanism is a 47 inch shovel, operating automatically at 47 strokes per minute. This means capacity plus speed.

The "Automat" cleans up down to the pavement and does it in its stride without digging into or taking a soft bottom.

These "Automat" features assure maximum efficiency . . . larger tonnage . . . lower costs per ton. And, the ease with which the material is handled, accounts for the "Automat's" low power consumption—only 1/5 K.W.H. per ton of material loaded—and its low maintenance cost.

No, you can't afford to overlook the "Automat". To see its 47 inch shovel loading coal at 47 strokes per minute is to understand why this loader means larger tonnage and lower cost. Write for completely illustrated operating manual now! Myers-Whaley Company, Knoxville 6, Tennessee.

OPEN
MYERS-WHALEY

**Mechanical Loaders Exclusively
For Over 36 Years**



MILES FROM NOWHERE— BUT THE MESSAGE GETS THROUGH

He'd crawled, run, crawled again. Now he was far ahead of his company . . . cut off completely from American forces except for a strand of Laytex Assault Wire.

But his messages got through surely and clearly . . . made possible a successful advance.

Laytex Assault Wire is made expressly for jobs like this. It's extremely lightweight . . . yet tough enough to be used by advance scouts.

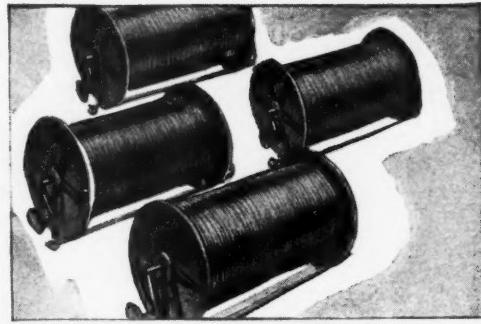
The use of such lightweight small diameter wire is possible only because the insulation is of such high quality—has high resistance to moisture, withstands a wide range of temperature changes and does not become embrittled when subjected to vibration and shock. Laytex Assault Wire has a talking distance of over five miles.



ASSAULT WIRE

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue • Rockefeller Center • New York 20, N.Y.



LIGHTWEIGHT Laytex Assault Wire weighs only thirty pounds per mile. This means that an advance scout can carry ample wire while pushing ahead.



LAYTEX ASSAULT WIRE is unaffected by moisture or temperature changes because of the high quality of the insulation. This means it can be laid and used successfully regardless of climate or terrain.



FIVE MILES LONG—but messages get through clearly. Laytex Assault Wire, tested and retested for quality, has a proven talking distance of more than five miles.



SPECIALLY DEVELOPED for front line service, Laytex Assault Wire is hard at work in Europe, Asia, the South Pacific.

Bulletin
No. 161

Bulletin
No. 161

Bulletin
No. 161

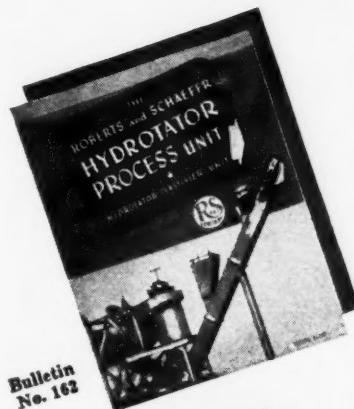
Bulletin
No. 161

COAL AGE

COAL PRODUCERS

INTERESTED IN LOWERING
COSTS AND IMPROVING
THE QUALITY OF THEIR
PRODUCT SHOULD HAVE

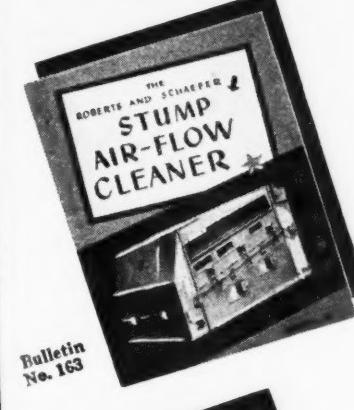
These New
Bulletins



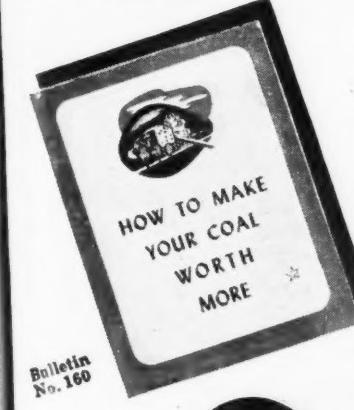
Bulletin
No. 162



Bulletin
No. 161



Bulletin
No. 163



Bulletin
No. 160

Coal that is adequately prepared, accurately sized, and efficiently cleaned, will be in the best "SPOT" for big demand in the post war markets.

Now is the time to bring your coal preparation methods up to date—thereby lowering the cost and improving the quality of the product.

That's where R and S come in—a seasoned organization of engineers skilled in designing and erecting modern coal preparation plants, or modernizing existing ones.

A practical suggestion, that will not obligate you, is to have Roberts and Schaefer survey your plant and submit a recommendation. Make a good start by writing us for the literature shown here.



ROBERTS and SCHAEFER CO.

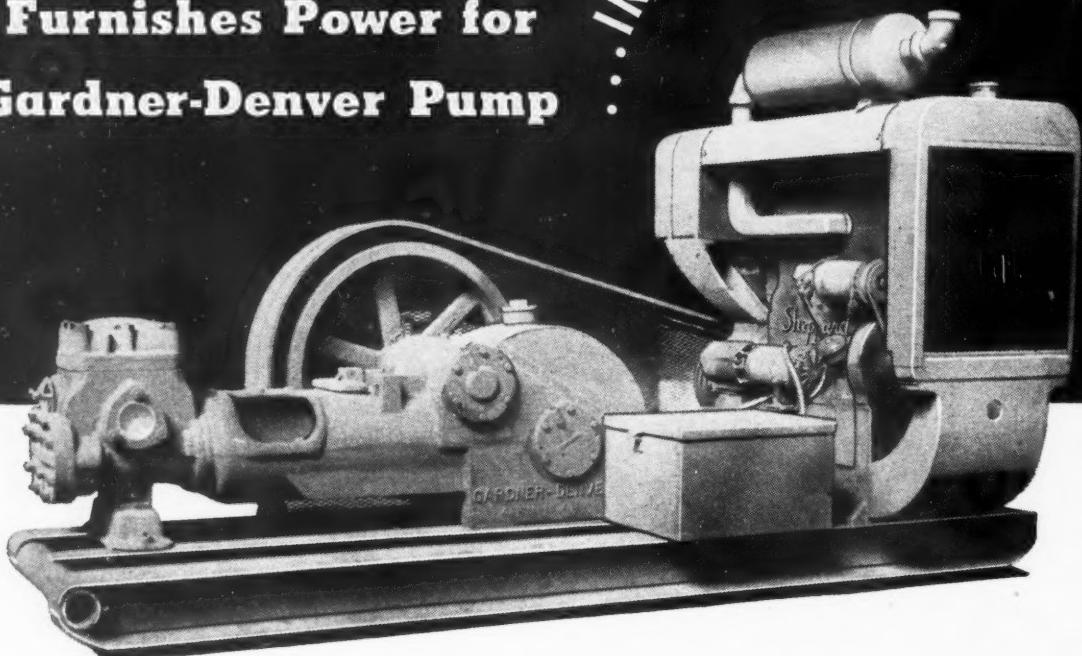
307 North Michigan Avenue, Chicago 1

P.O. Box 865 1711 Connecticut Avenue, N.W. P.O. Box 570
PITTSBURGH 30, PA. WASHINGTON 9, D.C. HUNTINGTON 10, W.VA.

THESE "CIVILIAN SOLDIERS" FORM A RELIABLE COMBAT TEAM

Sheppard DIESEL
Furnishes Power for
Gardner-Denver Pump

IN RUGGED FOREIGN SERVICE



WITHOUT the aid of a dependable power unit, Gardner-Denver pumps couldn't provide the steady, dependable operation necessary for gruelling military and lend-lease service. Pumps and power units must both be built to stand the terrific punishment of continuous duty—pumping oil, water, kerosene, etc., under conditions which are encountered only in wartime.

The precision-manufactured Sheppard Model 6A Continuous Duty Diesel which powers the 95 GPM unit shown above will develop 25 H.P. at 1200 RPM . . . 24 hours a day . . . seven days a week.

Oil cooled pistons, hardened, replaceable cylinder liners, 4% (closer if required) governor regulation device—products of skillful engineering—make Sheppard Diesels the most economical source of

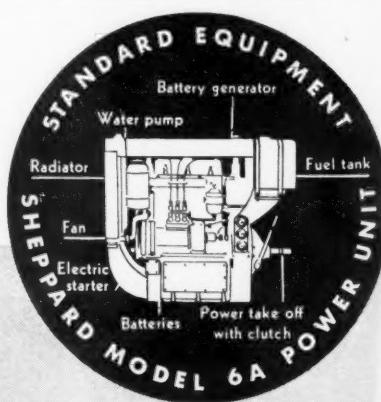
power to use and maintain. The simplified Sheppard fuel injection system is added insurance of continued efficient operation.

Sheppard Diesels are delivered complete according to specifications . . . ready to run without makeshift additions. They are compactly designed for easy installation in new equipment or to convert more costly, less efficient power installations to the economical use of Diesel.

While we, too, are devoting most of our energy to the war effort, we are looking forward to the time when we can again supply enough engines to meet the demands of our customers. In the meantime, Sheppard engineers will be glad to plan your post-war power requirements with you. Write for information and illustrated data sheet on the Sheppard Model 6A today.

R. H. SHEPPARD COMPANY, HANOVER, PA.

Sheppard
ALL AMERICAN
DIESELS



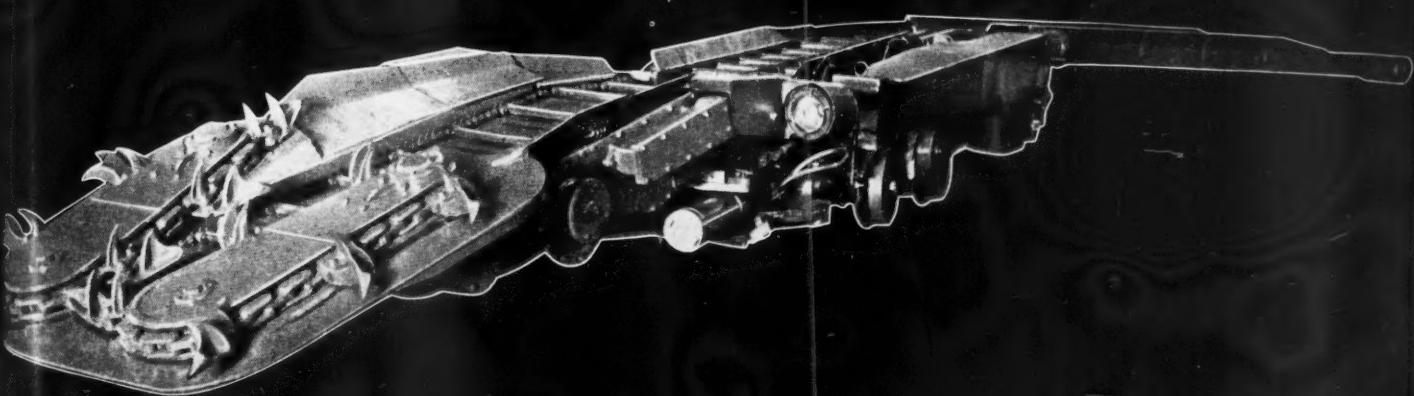
World's APPLICATION RANGE...

CLARKSON Universal **LOADER 24 BB** **TRACK MOUNTED**

- Built for 38-inch coal and over — has a fast loading and trammimg speed. The highest point of conveyor is only 23 inches from rail.

— Ability of this LOADER to dig in very low as well as high seams of coal—its adjustability to loading low or high mine cars means faster production. Digs out tight corner shots perfectly —operated from one central point — vertical or horizontal adjustment — flexibility to meet your requirements. This LOADER will give you greater tonnages at less operating cost.

LOWEST LOADING MACHINE ON WHEELS



The **CLARKSON**
MANUFACTURING COMPANY

NASHVILLE

ILLINOIS

PATENTED

Our troops go ashore from a landing barge to engage the enemy.
ACME PHOTO



Wire Rope goes wherever our land, sea and air forces go. To carry the fight to the enemy, their supply of rope must constantly be renewed and expanded. You tell them, "Here . . . use some of mine," every time you get along with fewer new ropes. The suggestions below, if followed, will help you conserve wire rope . . . and time . . . and manpower . . . by making each rope installation deliver maximum service:

1. Use preformed rope wherever possible. It handles more easily . . . requires a shorter breaking-in period . . . resists kinking and bending fatigue . . . protects men and equipment from broken outer wires.

2. Instruct operators in correct practices. Wire rope life is in their hands. By avoiding overloads, jerking, too fast acceleration and excessive speeds . . . by watching drums and sheaves for conditions that cause rubbing, nicking or pinching . . .

the operator may double the service of a rope.

3. Lubricate wire rope faithfully. Think of those endless grooves between wires and strands as oil holes through which the moving wires and hidden core must get sufficient lubrication to minimize friction and wear. Rust and corrosion attack rope parts whether working or waiting, unless you provide a protective coating.

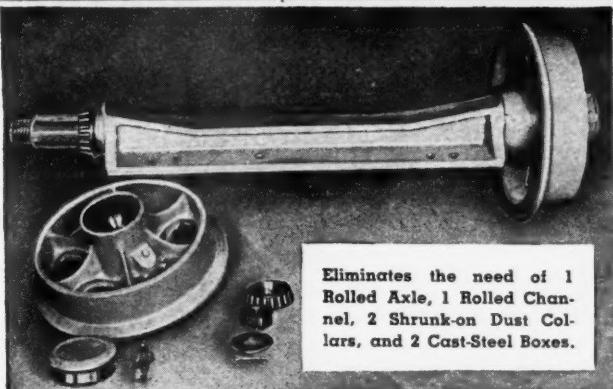
And team up ropes that give uniform service. Preformed Yellow Strand Wire Ropes work smoothly together because they are engineered to the same standards of efficiency and durability. Used on hoists, inclines, mining machines, car dumpers, tramways, draglines, shovels, they take a lot of the headache out of wartime mine operations. Our Hand Book, "Wire Rope for Mining," contains many practical pointers. Send for a copy . . . today.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

YELLOW STRAND PREFORMED WIRE ROPE





Eliminates the need of 1
Rolled Axle, 1 Rolled Chan-
nel, 2 Shrunk-on Dust Col-
lars, and 2 Cast-Steel Boxes.

IMPORTANT NEW PRODUCTS

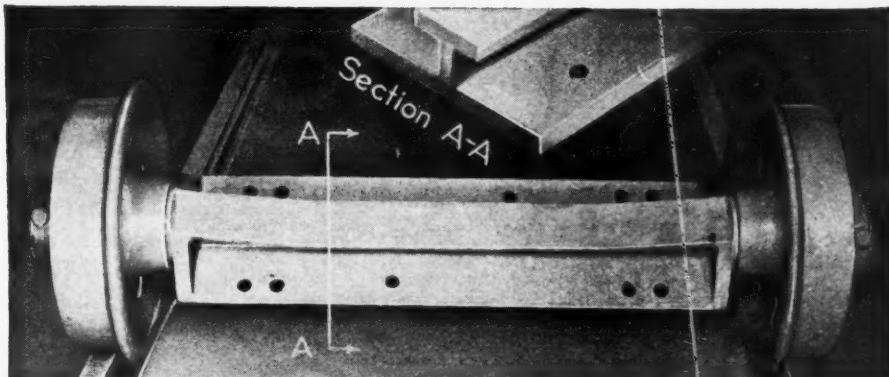
DUNCAN Integral-Cast STEEL AXLE CAST STEEL WHEELS

★ With treads cast to an accuracy almost equal to a machined surface. The quick, dependable, lowest-cost way to build your own mine cars in your own shops—in the DUNCAN Integral-Cast Steel Axle and cast steel Wheels.

Careful controlled chemical properties and proper heat-treating make DUNCAN Integral-Cast Steel Axles equal in strength to a rolled axle. They weigh 12 lbs. and replace 225 lbs. of weight. The following results were obtained by placing two axles in hydraulic press, each bolted flat to face of press and bent to a 30° angle on each end of axle—CAST AXLE . . . 225 tons—ROLLED AXLE . . . 200 tons—neither axle showing a sign of fracture.

Cast axles have been used for years on automotive trucks and trailers to great satisfaction. Investigate today and see how you can use them to great benefit—let us tell you how mines can save money, time, and materials with DUNCAN Integral-Cast Steel Axles and cast steel wheels.

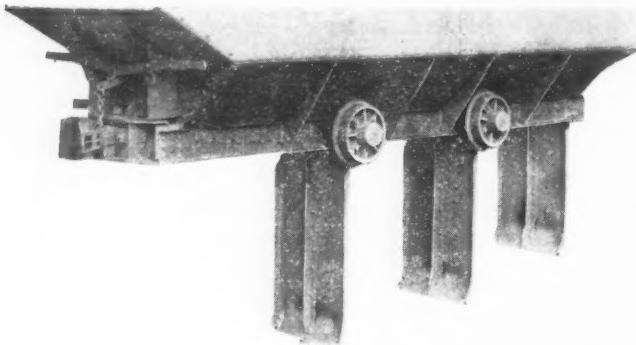
DUNCAN FOUNDRY & MACHINE WORKS, INC., ALTON, ILLINOIS



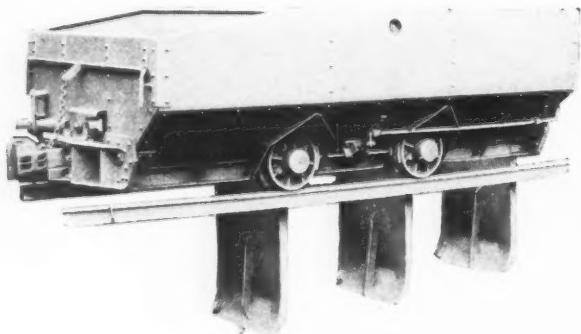
★ ★ ★ ALL S-D "AUTOMATICS" ARE
-because all Coal Mine



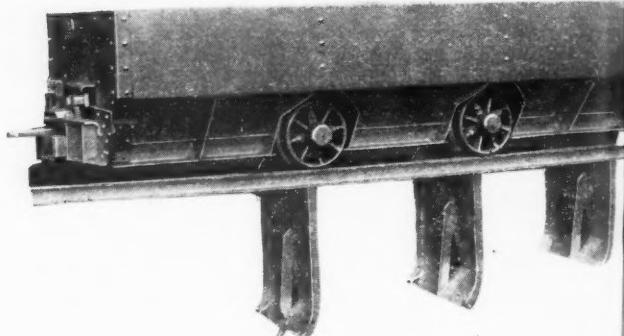
The Ben Hur Coal Co. car, an S-D 1-2-3 "Automatic" loaded by conveyor, and used for main line haulage, has 12 ft. sides, 38 in. height, with a w.l. capacity of 152 cu. ft., and averaging 4 to 5 tons per trip.



The Sandlick Coal Co. uses this S-D 1-2-3 "Automatic" with low rear end to facilitate mechanical loading. It has 14 ft. sides and height of 32 in., with a w.l. cap. of 228 cu. ft., but it averages 5½ to 6 tons per trip.



This S-D 1-2-3 "Automatic" is well known and is the largest underground automatic mine car we know of. It has over 19 ft. sides, is 52 in. high, with a w.l. cap. of 387 cu. ft. It is averaging 11 to 12 tons per trip on main line haulage underground for the Consolidated Coal Co.



Here's an S-D 1-2-3 "Automatic" built with over-lapping ends for continuous conveyor loading. It has 14 ft. sides, is 42 in. high, w.l. cap. 204 cu. ft. and averaging 5½ to 6 tons of coal. Has automatic couplers.



This S-D 1-2-3 "Automatic" built for the Jamison Coal and Coke Co., has 11½ ft. sides, is 47 in. high, with a w.l. cap. of 228 cu. ft. Its sloping sides at rear are to facilitate mechanical loading. It is averaging 5½ to 6 tons of coal per trip.



mine when get f engine to mo mine.

To ass cars . . . t reduc matic patter every well a

The l "Auto only w.l. c 2¼ t

T

SPRING CAP

METAL SEAL

FELT SEAL

SEPARATING BUSHING

San

COAL

Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

'ARE NOT ALIKE—

Mine haulage problems are not alike.

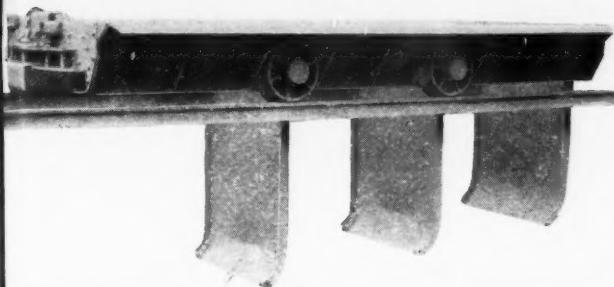
★ You just don't order S-D 1-2-3 "Automatics" out of a catalog. Every coal mine has its particular haulage problems and when you install S-D 1-2-3 "Automatics" you get far more than new mine cars. You get engineered haulage equipment . . . engineered to meet the individual requirements of your mine.

To assure you the increased tonnage with fewer cars . . . the great decreases in operating costs . . . the savings in manpower and other costs reducing claims we make for S-D 1-2-3 "Automatics", the cars must be tailored to fit your pattern. It's this engineering work, covering every detail, on each individual installation, as well as the famous 1-2-3 automatic principle of

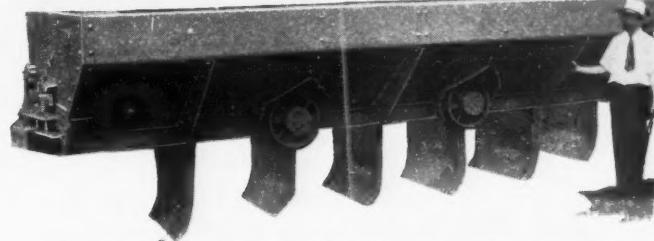
discharging coal, that has made these remarkable cars so amazingly successful.

Only the 1-2-3 automatic principle of discharging is invariably the same, regardless of size or capacity of car . . . and it's equally effective on all cars whether they be $1\frac{1}{2}$ or 25 ton capacity.

Coal mines everywhere are recognizing, more and more, that S-D 1-2-3 "Automatics" are essential engineered haulage equipment for modern mining. Mines with obsolete types of cars are changing over more rapidly than many operators realize. If you are thinking about new cars for 1944, you should do something about it now.

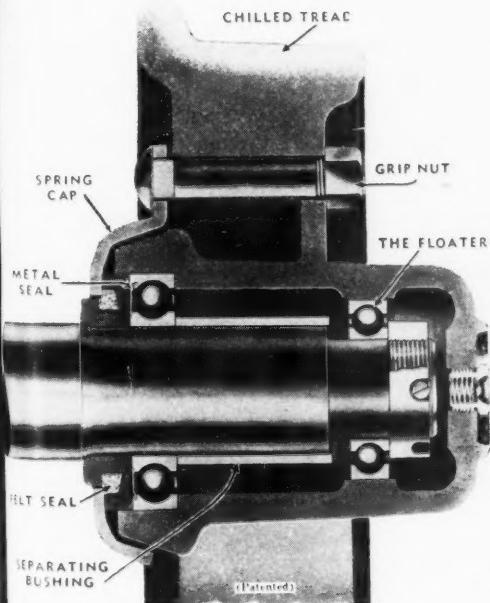


The Big Jim Coal Co. uses this S-D 1-2-3 "Automatic"—a low boy with a height of only 18 in. and sides of 12 ft. It has a w.l. cap. of only 62 cu. ft., but is averaging $2\frac{1}{4}$ to $2\frac{1}{2}$ tons of coal per trip.



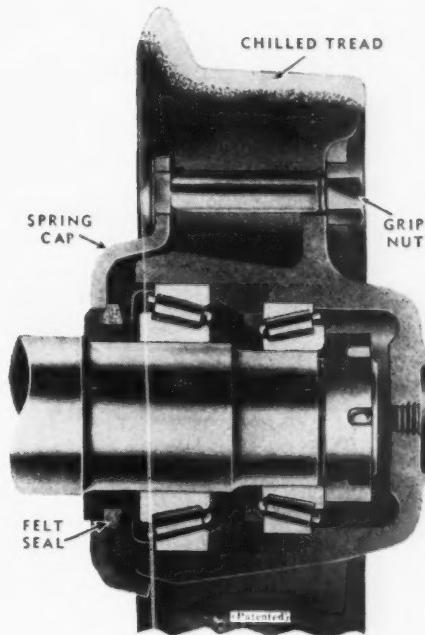
Here is an S-D 1-2-3 "Automatic" underground transfer car that is well known. Note the 6 door construction for discharging coal on to moving conveyor. This car has 15 ft. sides and 40 in. height, with a w.l. cap. of 254 cu. ft., but it averages hauling 8 to 9 tons of coal.

The Mining Industries' Most Reliable Wheels!



★ And when we say reliable, we mean not only from the standpoint of long satisfactory service, but long, satisfactory service without expensive maintenance . . . service that saves you money in grease and greasing labor . . . service that gives you smoother running, longer trains of cars . . . service that assures you of lower power costs.

Whether you prefer ball or roller bearing wheels, you'll find the most reliable wheel in one of the S-D twins—the S-D "Floater" Ball Bearing or the S-D Timken Bearing wheel. Both have the quickly demountable, closed front hub and grease saving features that only S-D wheels give you.



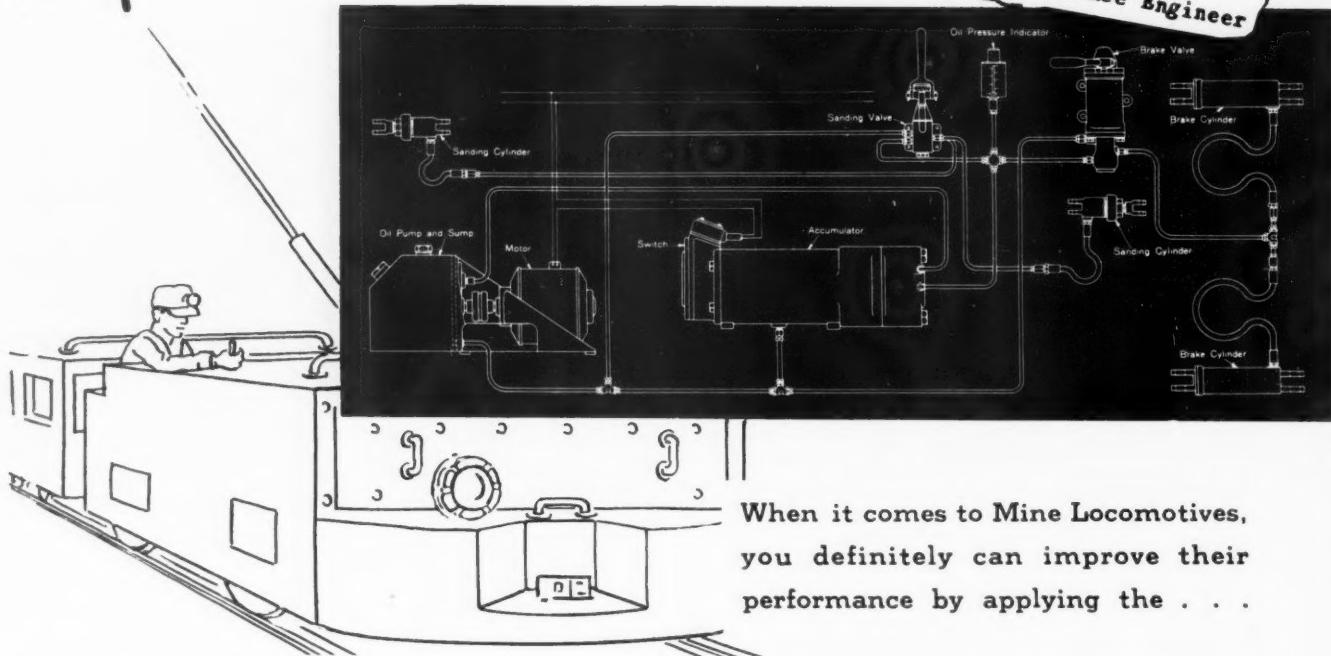
Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

OK
Mr. Maintenance
Engineer!

From Coal Age News
November, 1943

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Maintenance Engineer



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you definitely can improve their
performance by applying the . . .

Westinghouse HYDRAULIC BRAKE

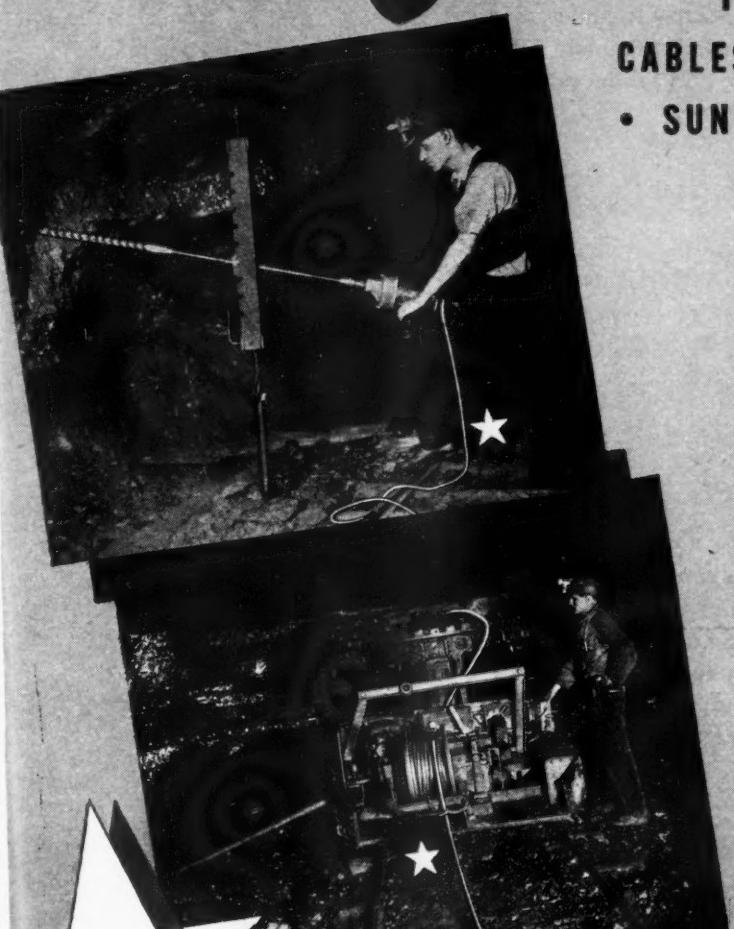
Here are five down-to-earth reasons, as reported by one user, why you can use The Hydraulic Brake profitably:

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- 3** Motor Bucking to Check Speed or Stop Entirely Eliminated.
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- 5** Less Sand Required — Better Rail Contact Cuts Power Loss and Overheating.

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FOR Portable CORDS AND
CABLES THAT MUST RESIST: HEAT
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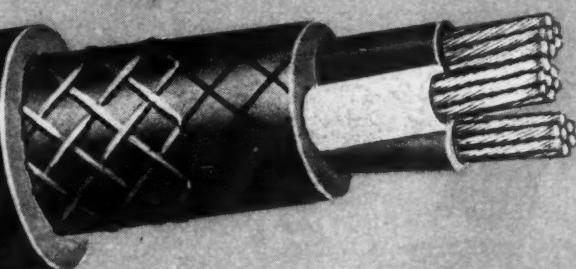
HAZAPRENE
in use where
corrosive mine
waters and me-
chanical abuse
would take a
quick toll of ordi-
nary cables.

HAZAPRENE portable cords and cables have plenty of mining applications. The outer jacket, compounded with neoprene—DuPont's well-known synthetic rubber, provides maximum protection against the many hazards encountered in mining operations.

These cables resist heat and can be used in locations subject to elevated temperatures. Sunlight, likewise, has no destructive effect. Unaffected by the solvent action of oil and grease, these cords will stand up under the lubricants which quickly attack rubber. Problems of corrosion due to acids, alkalies or other chemicals also can be overcome with HAZAPRENE. In addition, the toughness, flexibility and abrasion resistance of HAZAPRENE mean unexcelled ability to withstand severe mechanical abuse.

Specify HAZAPRENE for shovel cables, welding cords, portable tools and lamps, reel cables, and portable power cables for cutting and drilling machines. Its all-round resistance reduces repairs, and extends service life far beyond that of ordinary cables.

HAZAPRENE is available in all standard sizes and constructions, subject to WPB limitations. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.



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**Rebuild worn or damaged
machinery parts by these proved Airco processes**

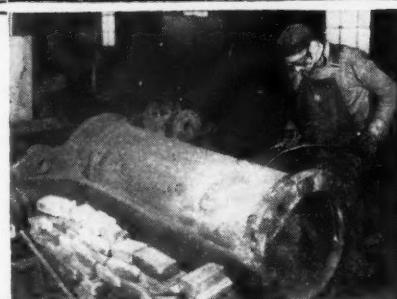
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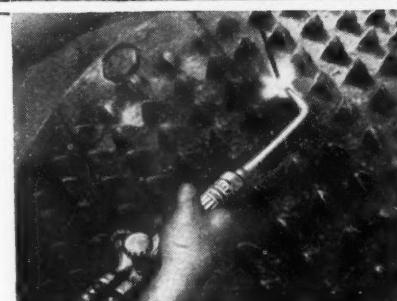
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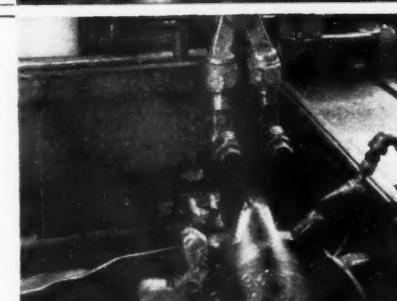
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worn cutter bits, and other tools subject to heavy abrasion gives unusual wear-resistance to these parts. Using Stoodite Hard Facing alloys — Stoodite, and Stoodite Self-Hardening — worn cutting and drilling equipment is rebuilt quickly and economically.



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imparts a wear-resisting surface, without affecting the core properties of steel. With standard Airco equipment all common steels of 0.35% carbon content or greater may be flame hardened to controlled depths and hardnesses with minimum distortion.

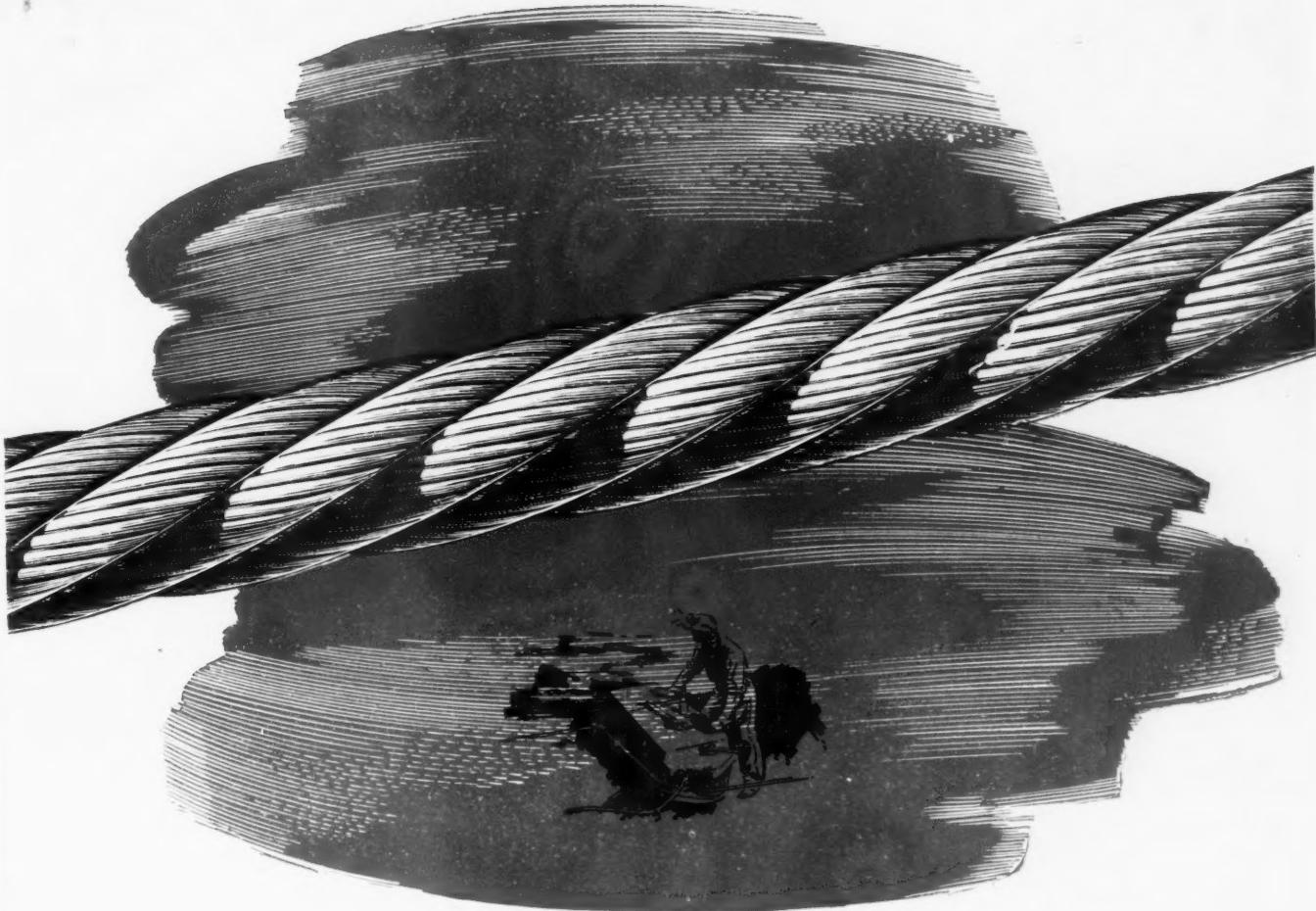


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WHEN you tally up the term of service and the actual work done, against the initial price . . . you know the real cost of a cable! And the smart buyer buys by the last cost, and not the first price. Where costs are really counted, Rochester is the first choice . . . a preference earned by long life, freedom from work stoppage and accidents . . . in every industry where wire rope is rated as important, in tough jobs all over the world! . . . Today the entire output of both Rochester plants is restricted to Government services and a few priority industries. Tomorrow, when the market is open again, for the best performance and best profit in wire rope—remember Rochester.

ROCHESTER *Ropes*
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If this Tank could talk . . .

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February, 1944 • COAL AGE

CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

Reduces COSTLY MINING Hazards

♦ Mines that have adopted the CARDOX non-explosive method of dislodging coal are maintaining enviable safety records.

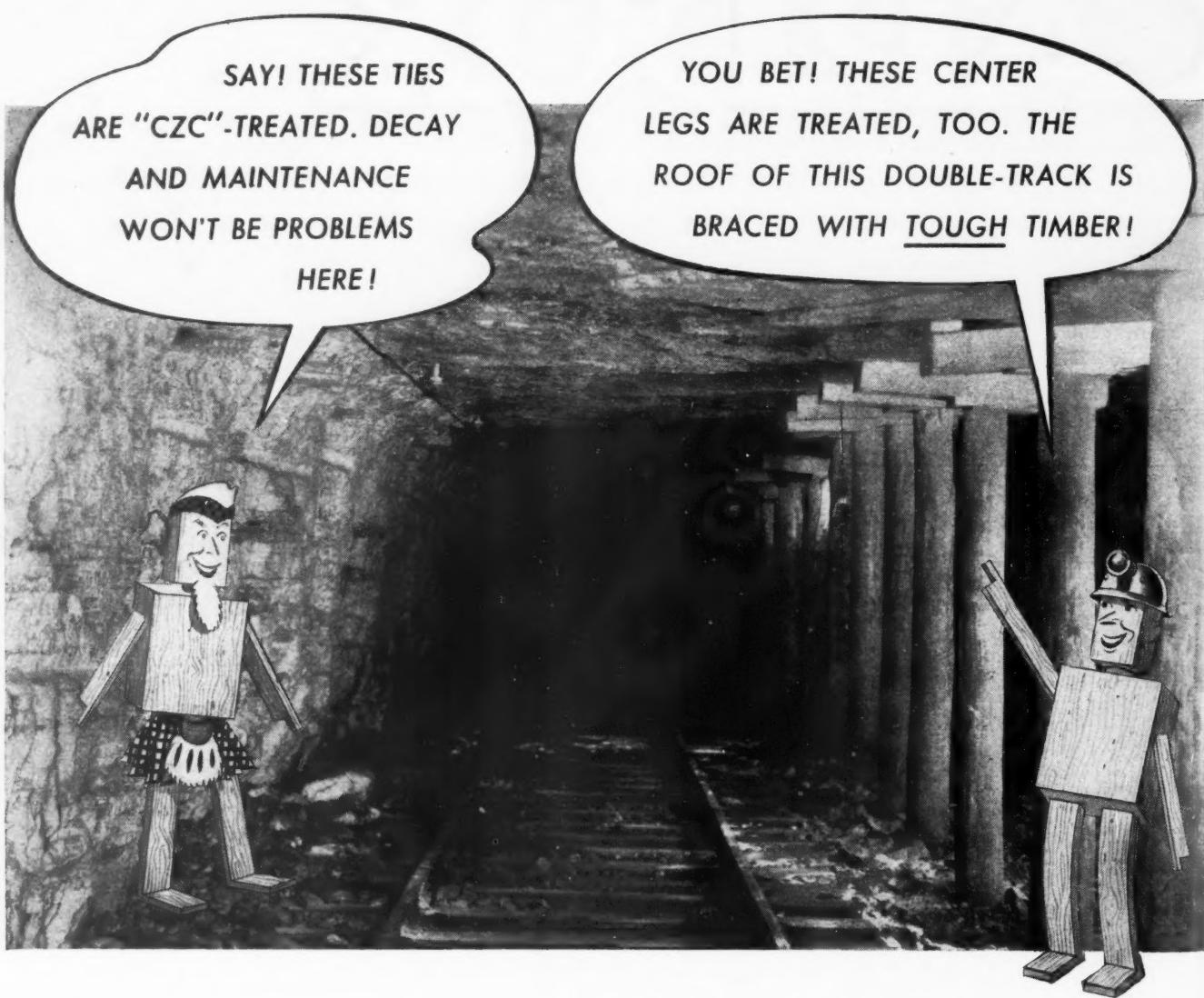
CARDOX removes the hazards of storing and handling explosives. Impacts, friction, sparks or even flames have no effect upon the carbon dioxide with which CARDOX tubes are charged. This chemically inert gas is smokeless, odorless, non-poisonous and will not support combustion. In fact, because of its fire retarding properties, it is widely used as a fire extinguisher.

Because CARDOX produces a slow steady pushing action it is less likely to cause roof failures. It squares up both face and rib so that the dangers resulting from overhanging brows in high seams are greatly reduced. It eliminates the possibilities of dust and gas explosions by blown out shots. In brief, CARDOX mining is unquestionably the safest coal mining method known.

Let us demonstrate by a test in your own mine how CARDOX can help increase production while reducing costly mining hazards.

- Illustration at right shows typical scene in CARDOX-equipped mine, with racks of CARDOX Tubes ready for breaking down coal or fire fighting duty. Placard on post tells how to use CARDOX Tubes as emergency fire extinguishers.

CARDOX CORPORATION • Bell Building • Chicago 1, Illinois



TODAY, more than ever before, the trend is to ties and timber treated with Chromated Zinc Chloride. And no wonder! Decay that flourishes in the humidity of the average mine is prevented by "CZC." Treated ties and timber last many times longer, add safety, reduce maintenance costs and actually pay dividends by eliminating frequent and early replacements.

Get all the facts about wood preservation for mines. Write E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Delaware.

Let's All Back the Attack!

DU PONT CZC

(CHROMATED ZINC CHLORIDE)

WOOD PRESERVATIVE



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

We Scrapped Tradition in
Going after these Objectives

LESS LOST SHOVEL HOURS

MORE TONS PER BLAST

and we GOT them!

In order to get proper production costs you must balance your mining equipment with your transportation and preparation equipment. But before you can load, transport, and prepare your coal you must first shoot it.

National "Slim-ite" Powder Series (No's 1-2-3) for the overburden in Strip Mining are new and revolutionary. The formulae of these powders are not one year old. But each month they are going on new Strip properties and proving their economy.

National Powder Company's ten Permissibles are new formulae for Deep Mines. More than Eleven Million pounds of National Permissibles have been used in Indiana, Kentucky, Ohio, Pennsylvania, Virginia, and West Virginia."

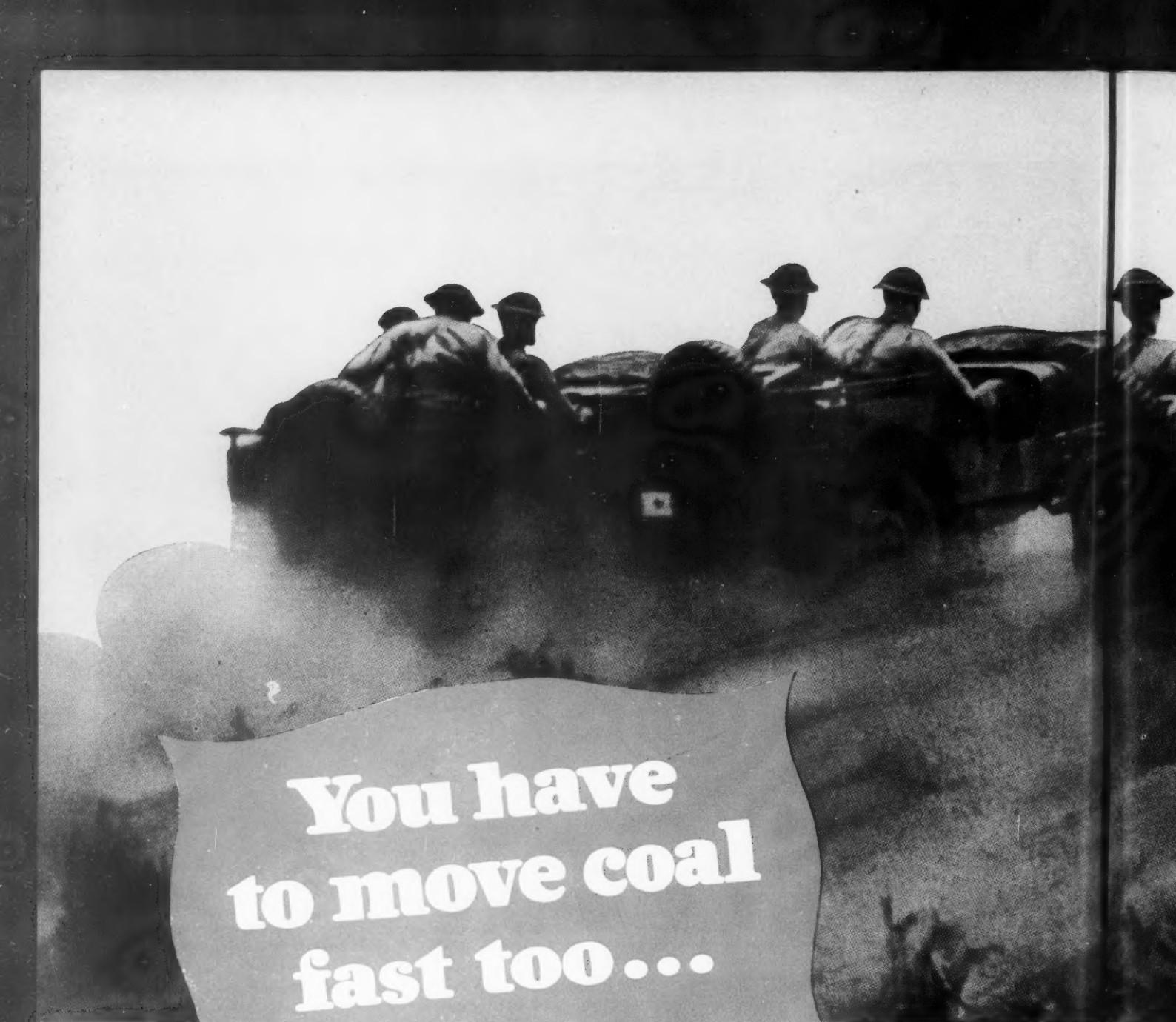
• Following tables as of United States Bureau of Mines approved list:

Permissible	BRAND	VELOCITY	CARTRIDGES PER 50 LB. CASE
High Speed	National "A"	9800 ft./sec.	1 1/4 x 8 — 142
	National "B"	12100 ft./sec.	1 1/4 x 8 — 160
	National "C"	10200 ft./sec.	1 1/4 x 8 — 225
Medium Speed	National "D"	7900 ft./sec.	1 1/4 x 8 — 140
	National "E"	9100 ft./sec.	1 1/4 x 8 — 160
Low Speed	National "F"	6600 ft./sec.	1 1/4 x 8 — 230
	National "F"-I	5700 ft./sec.	1 1/4 x 8 — 250
	National "G"	5600 ft./sec.	1 1/4 x 8 — 200
	National "H"	5100 ft./sec.	1 1/4 x 8 — 180
Permissible Gelatin	Napcogel No. I	15000 ft./sec.	1 1/4 x 8 — 103

These Powders are for Anthracite and Bituminous Mines
See our Catalog data in Coal Mining Catalogs

NATIONAL POWDER COMPANY
ELDRED (McKean County) PENNA.

MANUFACTURERS OF HIGH EXPLOSIVES FOR ALL INDUSTRIAL PURPOSES



You have
to move coal
fast too...

H Armstrong Roberts

JOY mechanized u



JOY
Loaders

Joy Loaders have proved their worth in hard, constant service with the most severe usage. Strong, ruggedly built, their maintenance is at a minimum.

Shuttle Cars are designed specifically for service with stand up under

JOY

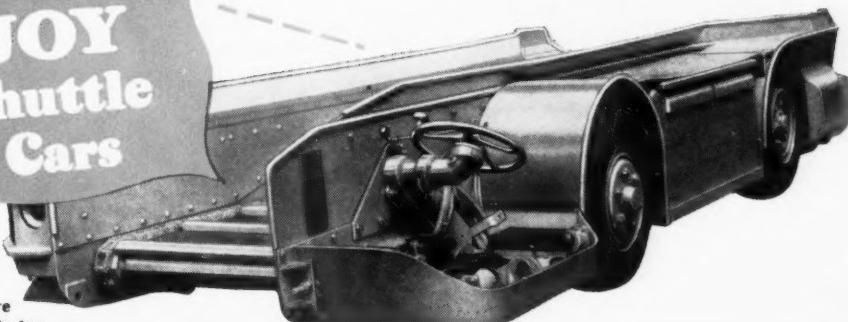


I units

The difference between winning or losing the battle of production can generally be found in the efficiency, or lack of efficiency, of production equipment. Joy Mechanized Loaders and Shuttle Cars are doing an outstanding job in mines the Nation over—constantly creating new tonnage records by their naturally fast, thoroughly consistent operation.

JOY
Shuttle
Cars

Shuttle Cars are
designed specifically for
mine service with a built-in ability
to stand up under constant hard use.



Consult
a Joy
Engineer

JOY MANUFACTURING CO., Franklin, Pa.



The roof rushed by just above the slope car . . .

"Keep your head down!" yelled Jackson. I ducked . . . and grinned, for it reminded me of some of our own safety rules for safety fuse — so *obvious* and yet so necessary. For the roof of the slope was rushing by just above the top of the car.

"Kind of an imposition to drag you down here," said Jackson, as we climbed out at the



"Feel that lump?" I asked

bottom. "Fact is, this premature shot can't be blamed on the fuse at all, because it went off while the miner was loading. But I thought you people could tell us what's wrong. The miner can't — he's in the hospital."

"That's usually the case with a premature," I said, as we started down the entry. "The man who could have told us *why* is killed in the blast. Was anyone else injured?"

"Fortunately, no," replied Jackson. "Pollix — that's the miner's name — was loading his first hole — had just pushed the primer cartridge in when she blew. His helper was behind a pillar and was only bruised . . . we turn here . . ."

A short walk brought us to the room where

Jenner, the helper, was waiting. "Who made up the primer cartridges?" I asked.

"Pollix," replied Jenner. "He had 'em all ready over here," and he pointed to a miner's box, set well back of a large pillar. I looked in and saw the usual coils of safety fuse, box of caps, and a crimper. In the box also were several primed cartridges. I examined them.

"He'd just finished makin' 'em up," volunteered Jenner, "and taken one to start loading. I was going to pick up the rest and follow when the whole place blew up!"

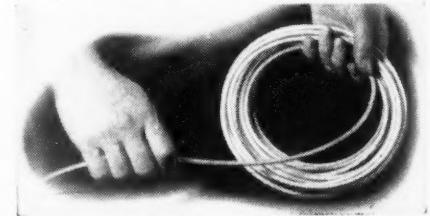
The cartridges were all side punched, with the fuse tied on tightly; and looked like good jobs until I felt around the sticks with my fingers. Then I handed one to Jackson.

"This may be it," I remarked. "Feel that lump? That's the business end of the cap, *clear over next to the wrapper*. Here's another. The punched hole ends way off to one side, instead of ending in the middle of the cartridge. The hole was probably pretty rough inside, and he may have pushed extra hard

on the stick. It's evident that a squeeze or jam or something set the cap off. They're pretty sensitive things, you know."

Pollix had probably been priming cartridges for 20 years, and never had any trouble until a rough hole caused a jam which set off the cap. There's only one way to avoid a thing like that: *bury the cap well inside the cartridge, where it will be protected by the powder on ALL sides. Do this every time and you won't need to worry.*

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut



ENSIGN - BICKFORD
Safety Fuse
Since 1836
Also Makers of Primacord-Bickford Detonating Fuse

Coal Age

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

February, 1944

A Job for Coal

WHAT YEAR will be the crucial one in the United States victory march? When will it be necessary for this country to put forth its maximum effort? If the signs have been rightly read, the year is this year—1944. "Invasion year" it has been tagged; "invasion year" it will be. With invasion, the country will put its stamina and its war preparations on the line. It will win, but victory will be no snap job easily accomplished with a few casualties and minor losses of materiel. Blood and treasure will have to be poured out and the United States must be prepared to pour unflinchingly when the time arrives.

The fact that invasion is on the 1944 schedule signifies the completion of one big step toward victory. It means that sufficient men have been gathered, trained and equipped for the start of the main event. By no stretch of the imagination, however, does it mean that the country can begin to slack off. The services, and rightly so, are planning for a grim struggle. And they want to be in position to throw their heaviest punches for as long as necessary, meaning that the home front still has a big job on its hands.

The job for coal mining has been set at over 620,000,000 tons of bituminous coal and 66,000,000 tons of anthracite in 1944. The physical facilities are there and coal has pushed technical improvements and the installation of equipment for improving efficiency and boosting tonnage. Real progress was made in this direction in 1943 in spite of the exigencies of war. Coal got, as far as they were available, equipment and materials commensurate with its essential character and made good use of them. That situation continues into 1944 and may even improve. The same, how-

ever, cannot be said of manpower nor of relations with labor and government, which figured so prominently in the failure to reach 1943 goals—a failure the industry was largely powerless to avert because of the passing of control to a bewildering list of government agencies and officials, often hostile to one another.

Sober analysis of the situation leads inevitably to the conclusion that coal can expect little, if any, relief on the manpower front for some time to come. But, unless the apple cart is upset again, the bituminous contract signed in December should go far toward settling the problem of labor relations, although as imposed by government fiat it brings up new problems of its own and severely penalizes the industry and the coal-using public for the increase in working time secured. And with a new contract, if approved, there may be some relief from the sudden and arbitrary action and political boondoggling which characterized governmental attempts at exercising controls over wages, labor relations and prices in 1943. But the ground lost in the process undoubtedly will mean continuation and perhaps strengthening of the distribution controls embarked on last year.

Coal's 1944 job is a big one and it must be accomplished against difficulties. But the prospects are good if government controls are exercised to give the industry a real chance. The undoubted handicaps can be offset if every minute of working time and every possible piece of equipment are utilized to the utmost. The results? Maximum support of our forces in the field at a critical time and further convincing evidence of coal's rightful role as an essential industry in war and the peace to come.

COAL AND WAR

GOVERNMENT AND LABOR RELATIONS

COAL MINING met its operating problems in good style in 1943 but fared less well at the hands of John L. Lewis and the various government agencies and officials exercising wartime powers over manpower, labor relations and wages. The net result was a steady loss of manpower, four work stoppages and two seizures, the second still in effect. Production goals, consequently, were not met, a growing number of distribution controls were put in force by the government, anthracite deliveries were restricted, and more and more consumers found themselves faced with the problem of using new and strange types of coal.

Bituminous Hits New High

Bituminous production in 1943 is estimated at 589,000,000 net tons by the Solid Fuels Administration for War. The goal was 600,000,000 tons. Production in 1942 is estimated at 580,000,000 tons. Next highest in history was 579,385,820 tons in 1918. As in 1942, the increase in 1943 was achieved with relatively little increase in producing capacity. The number of new deep mines was relatively small. Only in outcrop stripings in the East and South was there any major increase in number of active operations.

Anthracite output in 1943 is estimated at 60,327,000 net tons by the U. S. Bureau of Mines, 1,000 tons less than the 1942 total of 60,328,000. The 1941 anthracite output was 56,368,000 tons.

Manpower losses were another major factor in the 1943 picture, although these were offset in part by increases in working time. Following increases in days worked per week in the Rocky Mountain and Far Western regions

late in 1942, the six-day week was put into effect in the remainder of the industry, with a few exceptions, in January, 1943. To take care of added costs, OPA started granting price increases in January also. Anthracite maximums were raised 35 to 55c. per ton, depending upon size; bituminous, depending upon district and size, from 12.4 to 55c. per ton.

Manpower Losses Grow

Inauguration of the longer work week early in 1943, while helpful, still did little more than partly offset losses in manpower. Bureau of Labor Statistics figures indicate that in 1942 bituminous coal was able for many months to replace losses, in quantity if not in quality, so that average employment probably was close to the official figure of 457,000 in 1941. But in 1943, bituminous really began to lose, and available evidence strongly supports an estimated average employment of not over 400,000.

But while bituminous was able to increase its working force in 1940 and 1941 and hold the gain in 1942, the anthracite record is one of continuing losses: 96,417 men in 1938; 93,138 in 1939; 91,313 in 1940; 88,054 in 1941; 82,121 in 1942. Available evidence indicates that the average in 1943 was not over 75,000.

While these losses explain in part coal's difficulties in 1943 and forecast a heavier burden on ability to produce in the future, production goals were in a fair way of being achieved when Lewis set out to break the stabilization program and force a major wage increase, backing up his demands with work stoppages costing the opportunity to produce, according to estimates,

40,000,000 tons of bituminous and 5,000,000 tons of anthracite.

The opening gun in Lewis' campaign was fired when the Appalachian wage conference opened in New York March 10. Ground between his demands on the one hand and government stabilization regulations on the other, the operators were left with no choice but to ask the government to tell them what they could do. But with no sound labor policy and, in fact, still sticking to its credo that "Labor can do no wrong," the administration failed not only to meet the problem squarely but, as in other cases, devoted much of its efforts to finding a formula for granting at least part of the demands without seeming to violate stabilization measures.

Government Tries Seizure

May 1 foreshadowed the administration course and highlighted its lack of sound policy. On that day, President Roosevelt ordered government seizure of the mines. This move, the first of a number of sudden and arbitrary actions still characterizing the application of wartime controls to coal mining, was made to appear to the public as a curb on Lewis. In reality, it merely penalized the operators without hampering Lewis in the slightest, as subsequent events were to prove.

The War Labor Board, in directing a resumption of negotiations in May, furnished the out for both Lewis and the administration when it indorsed, by inference, the principle of portal-to-portal pay. From that time on, despite complete lack of evidence that the industry was liable and plenty to the contrary, no other government agency or official proceeded on any other basis

IN 1943

What happened in coal; what it portends for the future

but that portal-to-portal would be granted.

June 18 brought a WLB decision directing the signing of a new two-year Appalachian agreement. This decision was quietly forgotten after the President, on July 9, admitted inability to get Lewis to sign. On June 22, Lewis called off a third stoppage, putting on, however, an Oct. 31 deadline

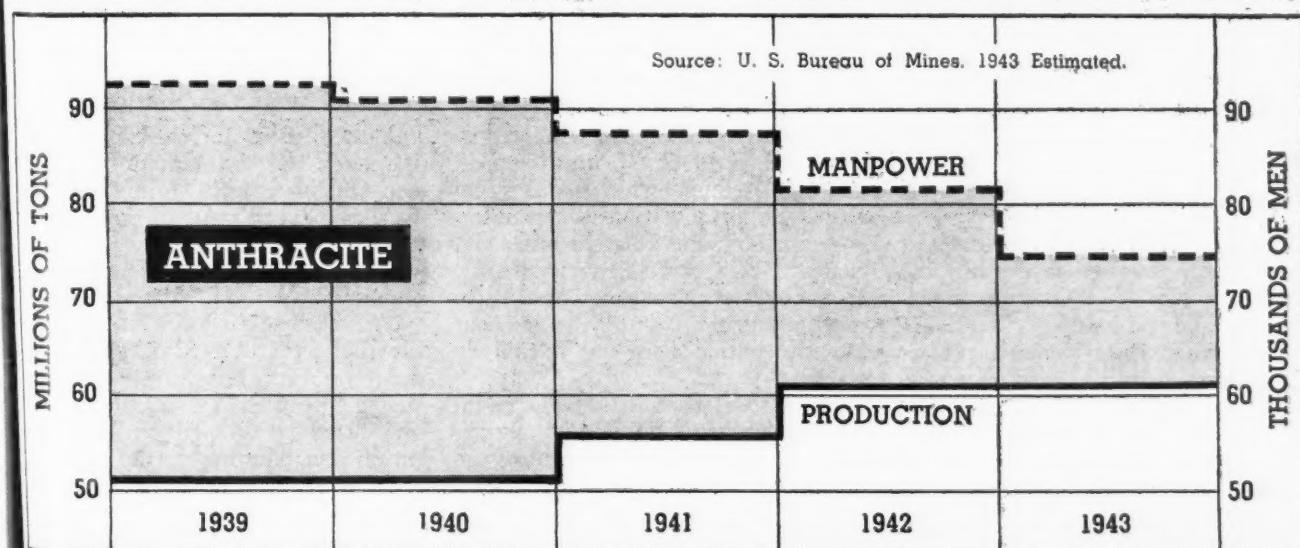
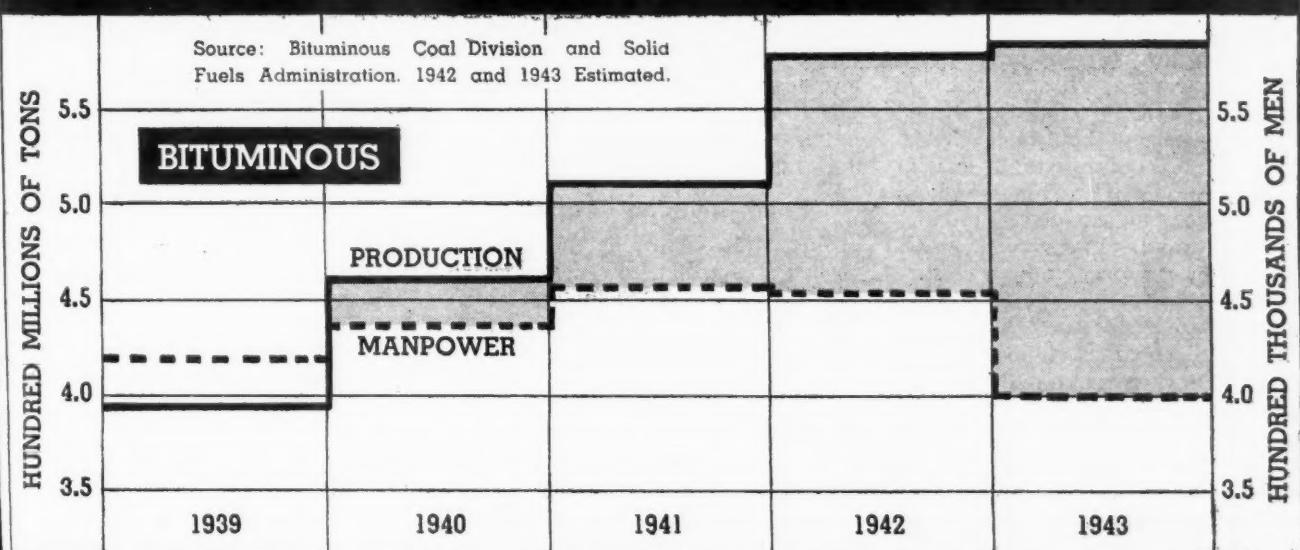
and a proviso that government operation continue. He beat by three days passage of the War Labor Disputes Act on June 25 over a Presidential veto.

Illinois accepted the portal-to-portal principle in an agreement signed July 20. An earlier attempt by central Pennsylvania to make an agreement (announced June 8) fell through

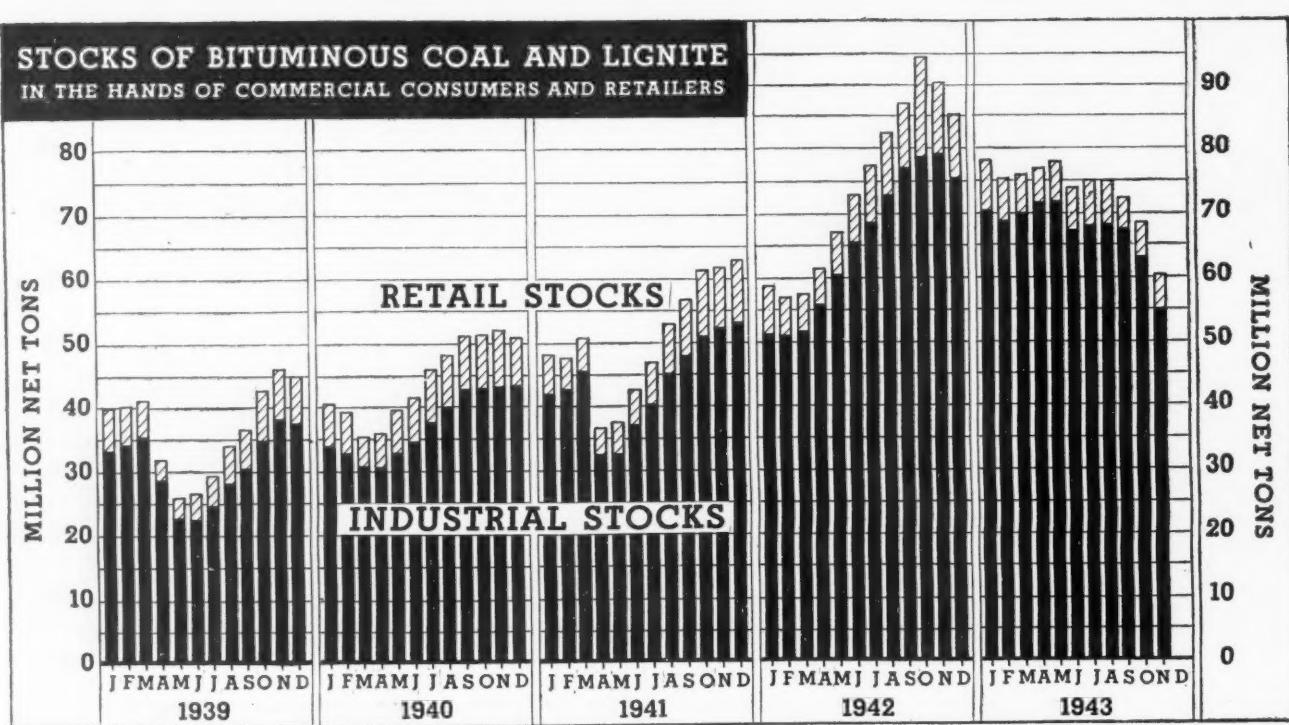
when the union refused a portal-to-portal protective clause. On Aug. 16, WLB authorized Ickes to institute a 48-hour week, which authority, however, Ickes failed to exercise. On Aug. 20, eight seized mines were returned, and on Aug. 25 WLB rejected the first Illinois agreement.

Illinois persevered, however, and on Sept. 23 signed a new contract pro-

COAL PRODUCES MORE WITH FEWER MEN



**STOCKS OF BITUMINOUS COAL AND LIGNITE
IN THE HANDS OF COMMERCIAL CONSUMERS AND RETAILERS**



viding an 8½-hour day and portal-to-portal. On Oct. 12, all mines were returned and wildcat strikes started. On Oct. 26, WLB rejected the second Illinois agreement but stated that it could approve one carrying a scale of \$8.12½ instead of \$8.50 for an 8½-hour day, including an assumed 45 minutes of travel time. On Oct. 28, WLB awarded the anthracite miners a retroactive increase of 32c. a day plus remission of tool, lamp and other charges previously granted bituminous miners.

With growing wildcat strikes culminating in complete stoppage of coal mining Nov. 1, President Roosevelt again staged his grandstand play—Seizure No. 2. This seizure was marked by another exercise of arbitrary and ill-defined powers—authorization to Secretary Ickes to offer the miners a contract or contracts based on the WLB opinion of Oct. 26 in the Illinois case. Thus, the stage was set not only for imposing portal-to-portal on coal mining but imposing it in the worst possible form.

Ickes Signs Agreements

Secretary Ickes quickly took the next step, signing agreements with the union on Nov. 3 covering both anthracite and bituminous. To make possible these contracts and also meet Lewis' wage demands, Ickes agreed to extending the "assumed" travel time of 45 minutes set up by Illinois to all coal mining and to reducing the lunch period from 30 to 15 minutes, thus giving bituminous miners 37½c. more per day and anthracite miners 37.8c.

On this basis, Ickes set the work day for inside employees at 8 hours and 45 minutes, including the "assumed" travel time of 45 minutes, with an intermission of 15 minutes for lunch, not to be paid for.

Price Situation Confused

With this out of the way, Ickes opened a campaign for an agreement between the union and the operators. Many demurred, not liking the prospect of an instrument similar to the U.S.-U.M.W. agreement. Uncertainty over the price outlook was another stumbling block, especially since the Nov. 3 U.S.-U.M.W. agreement set off another round of bickering between Ickes, OPA and other government agencies and officials. After the horse trading was completed, with the operators having no voice in the proceedings, OPA finally came out with "temporary" schedules on Nov. 24 (anthracite) and Nov. 27 (bituminous). The bituminous order was supplemented by an amendment Dec. 6 permitting operators still selling at less than cost to quickly adjust quotations to return full cost. In both the Nov. 29 order and that of Dec. 6, the idea seemed to be that increases would be granted to meet production cost, plus "some margin for contingencies" not definitely stated.

With some regions, notably southern Appalachian, refusing to participate, approximately 70 per cent of the bituminous tonnage gave in to government pressure and voted Nov. 30 to appoint a committee to draw up a con-

tract within the framework of the U.S.-U.M.W. agreement. This vote was taken despite uncertainty over the price outlook and also over what WLB's attitude might be toward the assumption of 45 minutes of travel time. To throw some light on this disputed point, which WLB stated it would have to have more data on, President Roosevelt appointed a special investigating committee Nov. 5.

Operators also pointed to the fact that the portal-to-portal method being imposed on them certainly would disturb established competitive relationships by imposing varying costs on different mines, requiring heavy investments to offset discrimination, or both, because of varying travel time. They also foresaw in the future substantial increases in cost when the union would again drive for a reduction in hours.

Bituminous Contract Signed

Despite these unfavorable outlooks, however, the bituminous industry, with the exception of the Southern Coal Producers' Association, which held out for paying for actual time worked rather than relying on an assumed travel time, signed an agreement practically identical in its major provision with the U.S.-U.M.W. agreement on Dec. 17. Effective for the period April 1, 1943-March 31, 1945, and made conditional on WLB approval and granting of the necessary price increases by OPA, the agreement also provided a \$40 payment in settlement of back portal-to-portal claims.

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Summing up, coal's relations with government and John L. Lewis in 1943 resulted in higher costs, with adequate price increases commensurate with these higher costs still a question; imposition on the industry of a contract promising serious disturbances in established relationships between companies and mines; laying of the groundwork for still further cost increases in the future; disturbance of established distribution practices and restrictions in deliveries due to tonnage losses

growing out of strikes; and, perhaps most important of all, a tendency to make the public eye coal with some question, despite the fact that its difficulties arose largely from matters beyond the industry's control.

But the picture in 1943 was not wholly dark. Coal continued its investment in cost-cutting equipment and methods and its research into improved utilization and new outlets. Both programs, in fact, were stepped up materially in the year just past.

And perhaps most significant of all, coal stepped up existing public relations work and embarked on new programs. The outstanding development in this connection was the organization of the Bituminous Coal Institute, which got into active operation in 1943. With increased work by individual companies and local organizations and associations, the industry's public-relations work really began to register in 1943, auguring a major improvement in the public's attitude.

COAL SUPPLY AND DISTRIBUTION

IN ADDITION to blasting hopes of reaching production goals of 65,000,000 tons of anthracite and 600,000,000 tons of bituminous, the four work stoppages called by John L. Lewis in 1943 brought in their train restrictions on anthracite deliveries and a number of Solid Fuels Administration for War regulations and orders designed to adjust available supplies of hard and soft coal to demand. The first such order came out May 4. Prior to that time, SFA and its predecessors, the Offices of Solid Fuels Coordination for Defense and War, had operated without issuing a single order or regulation. Even then, real exercise of powers to restrict deliveries and control distribution was not begun until June, after two work stoppages and threats of additional ones, plus growing manpower shortages, increasing absenteeism, declining individual productivity and other burdens had thrown doubt on the ability of anthracite and bituminous to meet 1943 goals.

Bituminous Output Up

Bituminous coal finally came out with an estimated production of 589,000,000 tons in 1943, an increase of 1.6 per cent over the 1942 estimate of 580,000,000 tons. Anthracite, however, as a result of a relatively more critical manpower situation and an additional stoppage—the dues strike of December, 1942, which ran over into 1943—achieved an output of only 60,327,000 tons, on the basis of preliminary estimates, or 1,000 tons less than the 1942 total of 60,328,000.

Most of the bituminous increase was achieved by Illinois, western Kentucky and West Virginia, plus the South-

western and Far Western states, where special efforts were put forth to meet the heavier demands growing out of the rapid increase in war production in the Gulf and West Coast areas. Practically all other states, including eastern Kentucky, showed losses in 1943 on the basis of 10-months' estimates.

Competing Fuels Gain

Competing fuels, on the basis of a year-end summary by the Department of the Interior, showed relatively greater gains than coal. Crude petroleum production was estimated at 1,503,000,000 bbl. in 1943, a gain of about 8 per cent. Natural gas reached an estimated total of 3,369,000,000,000 cu.ft. in 1943, an increase of 10 per cent. Two oil and oil products lines were completed from Texas to the East Coast, one 24 in. and the other 20 in. At the end of the year permission had been granted for the construction of a natural-gas line from Texas to West Virginia, although converting one of the two oil lines instead was under active discussion early in 1944.

Production of residual and distillate fuel oils in 1943 is estimated at approximately 630,000,000 bbl., about equal to consumption. Production in 1942 was 556,000,000 bbl. while consumption, according to the Bureau of Mines, was 592,146,000 bbl., including some crude burned as fuel. In the utility industry, consumption of fuel oil increased about 11 per cent; natural gas, approximately 26 per cent; coal, about 17 per cent—68,240,000 to 79,000,000 tons, the latter partly estimated. Consumption of liquid fuels by railroad locomotives increased about 13 per cent in 1943, while coal con-

sumption rose about 11.6 per cent—110,229,171 tons to 123,000,000 tons, partly estimated.

Total consumption of bituminous coal in 1943 is estimated by the National Coal Association at 589,346,000 tons; exports, 27,500,000 tons, making the total disposals 616,846,000 tons. The difference came out of stockpiles, which stood at 85,879,000 tons (including retail dealers) on Jan. 1 and 60,078,000 tons on Dec. 1, 1943.

Bituminous coal moved through retail yards showed a substantial increase in 1943. National Coal estimates the total at over 118,000,000 tons, against 104,750,000 tons in 1942. "This indicates clearly that a larger amount of coal has been placed in the bins of consumers than is customary and, at least, the household users of coal have in their bins, according to these figures, some 13,000,000 or 14,000,000 tons more coal than at the beginning of 1943."

Shipments Hold Up

Shipments of bituminous coal into certain consuming areas held up well in 1943 and, in fact, bituminous was being employed in increasing volume as a substitute for anthracite at the year end. Bituminous shipments to New England, according to SFA figures, were off approximately 1 per cent. Lake-coal shipments totaled 47,454,472 tons in the 1943 season (46,059,334 tons cargo and 1,395,408 tons fuel), a decrease of 4 per cent from the 1942 total of 49,455,153 tons. Stocks on the Upper Lake docks stood at 6,993,000 tons on Jan. 1, 1943, and 6,983,560 tons on Dec. 1.

Anthracite, because of a relatively more critical manpower situation and

one extra stoppage, fared less well than bituminous and at the end of the year operators were concerned with the growing trend toward substituting bituminous for part of the load previously carried. This substitution, plus a prohibition against shipments west of New York, Pennsylvania and Maryland and south of Virginia and the District of Columbia, led many operators to fear a permanent loss of tonnage within the regular anthracite territory as well as without.

Anthracite Cooperates

Many anthracite operators held that the restrictions and the drive for substitution were unnecessary if proper attention was given to impressing the principles of efficient use on consumers, plus some help in getting the coal mined, particularly in the field of manpower. But the industry nevertheless extended its cooperation and one of the projects carried on by Anthracite Industries, Inc., along with conservation and efficient use, was a study of the use of barley-bituminous and other anthracite-bituminous mixtures.

Despite restrictions in deliveries there was little change, however, in the over-all anthracite stockpile situation in 1943. The total in the hands of utilities, railroads and other industrial consumers, in producers' storage yards and on the Upper Lake docks stood at 3,297,474 tons on Dec. 1, 1943, compared with 3,211,754 tons on Jan. 1 and 3,295,899 tons on Jan. 1, 1942. Retail dealers, however, had stocks of only 197,757 tons on Dec. 1, 1943, against 358,327 tons on Dec. 1, 1942.

In anticipation of further increase in demand, SFA "estimates for the calendar year 1944 place bituminous coal consumption requirements at more than 620,000,000 tons. Anthracite consumption requirements for the similar period are estimated at about 66,000,000 tons." Both SFA officials and operators agree that manpower will be one of the most critical factors—in fact, the most critical—in achieving these goals. Continued conservation is a must, in the opinion of SFA officials. "Above all, it will be requisite," says Dr. Charles J. Potter, deputy SFA administrator, "that governmental controls over distribution be continued to make certain that the coal which is available will be channeled to meet essential war and civilian requirements. The extent and type of these will be conditioned on the availability of supply of the various types of coal in the different consuming areas" (Coal Age, December, 1943).

While they might offer difficulties,

particularly in anthracite, achievement of the 1944 goals is not looked upon as impossible if the opportunities for production are utilized to the utmost by men and management, if machinery and supplies continue available in the necessary quantities and if manpower drains are checked.

June 19 brought the first restriction on anthracite deliveries to consumers, the total being limited to not more than the tonnage of egg, stove, chestnut and pea shipped during April 1-Aug. 31, 1942, or five-twelfths of the tonnages shipped to such destinations during the period April 1, 1942—March 31, 1943. On Sept. 1, the tonnage was cut to 90 per cent and other sizes added. On Dec. 10, the percentage was further reduced to 87½.

Bituminous developments were characterized by several orders and regulations designed to level out stockpiling and insure deliveries to essential industries and shortage areas, but no restrictions were placed on quantities delivered except where they would build up reserves on hand beyond certain limits.

Conservation Pushed

Along with its distribution regulations and orders, SFA, in cooperation with producers and consumers, pushed campaigns for conservation. Supplementing previous measures, Secretary Ickes announced Oct. 8 the launching of a fuel efficiency program headed by a National Fuel Efficiency Council, with Thomas C. Cheasley, Sinclair Coal Co., as chairman. This movement, it was felt, could save conservatively 29,000,000 tons annually by promoting efficiency in industrial, commercial and domestic uses.

Following is a list of orders and regulations issued by SFA in 1943:

Reg. No. 1, May 4—Empowering SFA administrator to issue directions requiring, forbidding or otherwise providing for the delivery of solid fuels by or to any person or persons; amended as to procedure in carrying out directions in Interpretation No. 1, Oct. 4, and Amendment No. 1, Dec. 2.

Order No. 1, effective July 6—Directing producers, wholesalers, distributors and dock operators to maintain and file certain records and information pertaining to anthracite shipments and distribution.

Order No. 2, Aug. 3—Prescribing establishment of bituminous coal producers' advisory boards.

Order No. 3, Sept. 1—Requiring maintenance of records and filing of reports and other necessary information and statistical data on shipments, distribution, etc., except Pennsylvania anthracite; order designed to replace statistical set-up under the Bituminous

Coal Act and provide additional data; amended Oct. 19 to take care of special situation in the lignite fields of North and South Dakota and Texas.

Revised Reg. No. 2 (originally issued June 19 and amended July 13), effective Sept. 1—Concerned with limitations on anthracite deliveries and methods of distributing available supplies. The revised regulation added more sizes, restricted deliveries to 90 percent of the tonnage in the base period April 1, 1942—March 31, 1943, and set up additional provisions for obtaining supplies in cases of deficiency and insuring equitable distribution; amendment No. 1, Sept. 22, added broken coal to the list and removed Buckwheat No. 2; Amendment No. 2, Dec. 31, provided for additional shipments to keep certain dealers going.

Order No. 4, Sept. 1—Prescribing areas and times for limitations and restrictions on anthracite deliveries in pursuance to Revised Reg. No. 2.

Reg. No. 3, Aug. 24—Prohibiting ex-dock shipments to Washington, Oregon, Idaho, Montana and Wyoming.

Reg. No. 4, Aug. 23—Establishing, in effect, a system of priorities in distribution of bituminous coal, with coke, smithing, gas manufacture, chemicals and foundry, malleable and metallurgical purposes having first call and lake shipments second; applicable to Districts 1, 2, 3, 4, 6, 7 and 8; amended Sept. 7 to further control shipments from District 8; later superseded by Reg. No. 10 except as to priorities on gas, smithing and by-product coal.

Order No. 5, Sept. 7—Relating to restrictions on deliveries of bituminous coal to supplies in consumers' hands; applicable in Districts 1, 2, 3, 4, 6, 7 and 8; later superseded by Reg. No. 10.

Order No. 6, Sept. 15—Providing for creation and operation of a "National Anthracite Distribution Committee" and supplementary regional committees.

Order No. 7, Sept. 28—Directing producers, wholesalers, distributors and dock operators to maintain and file certain records and information pertaining to anthracite shipments and distribution.

Reg. No. 5, Oct. 11—Providing supplies of anthracite for poultry brooders and hatcheries.

Order No. 8, Nov. 1—Defining terms and applicability of WPB Order M-316 and companion SFA orders governing coal deliveries and holding of cars on mine tracks; revoked by Order No. 10.

Order No. 9, Nov. 6—Suspended certain restrictions under WPB M-316.

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Order No. 10, Nov. 8—Suspended order requiring holding of unbilled loads on track and revoked Order No. 8 governing shipments of unbilled coal frozen at the mines in Districts 2, 7 and 8.

Revised Reg. No. 6 (originally issued Oct. 30 and amended Nov. 1 and 6), effective Nov. 18—Restricting deliveries of anthracite in accordance with supplies on hand and prescribing delivery procedure as well as methods of cooperation with ODT and local ODT committees in distribution; amended Dec. 10 to further define and regulate cooperative action and reduce deliveries to 87½ per cent of the base period; replaced OPA Ration Order No. 19.

Revised Reg. No. 7 (originally issued Nov. 2), effective Nov. 9—Restricting deliveries of bituminous coal by dealers in accordance with supplies

in hands of users and providing for cooperation with ODT; deliveries in Pacific Northwest exempted as already covered by OPA Ration Order No. 14A, issued Sept. 18.

Reg. No. 8, Nov. 4—Modifying provisions of Oct. 29 directions requiring holding of unbilled cars of lump and double-screened bituminous coal in Districts 2, 7 and 8 to release such coal to Michigan, Ohio and for vessel use.

Reg. No. 9, Nov. 11—Sets anthracite quality standards; amended Nov. 17 to make clear that standards are on a weight basis.

Reg. No. 10, Nov. 17—Designed, by restrictions on deliveries, to equalize consumer stocks; applicable to shipments from Districts 1 to 13, inclusive, except 5 and 12; supersedes Order No. 5 and Reg. No. 4 (except that part dealing priorities on gas, smelting and byproduct coal). In general, deliveries

under Reg. No. 10 related to supplies in the hands of consumers; certain coals and uses exempted; certain information on coal movement required to be kept and reported; exemption from liability for breach of contract provided. Interpretation No. 1, clarifying delivery provisions, issued Nov. 25; Amendment No. 1, effective Dec. 10, directed earlier filing of orders and reports.

Notice to District 8 Producers, Dec. 31—Required producers in said district serving southern states to ship to retail dealers in those states for three days the entire production of all sizes covered by such orders.

Reg. No. 11, Dec. 31—Prohibits shipments of anthracite west of New York, Pennsylvania and Maryland; south of Virginia, District of Columbia and Maryland; west of same general line in Canada.

DEEP-MINING PRACTICE

WITHIN the framework of wartime restrictions, coal marked up new gains in 1943 in its drive for higher efficiency, lower cost and greater safety, as well as the primary wartime consideration—more tonnage. Equipment and materials figure prominently in such progress and coal, with its rating as a major war industry, got on the whole an adequate supply.

1944 Outlook Good

The 1944 outlook was for a continuation of this situation, if not an improvement, despite special provisions for meeting the critical British situation. "A program has been established," says WPB, "for the 12 items of mining equipment included in the list of 1944 domestic and United States requirements. Starting in April, 1944, and extending for a full year, underground equipment will be allocated monthly to the United Kingdom on the basis of one-twelfth of the total demand."

Further assistance is expected from a new rating structure which went into effect Jan. 1, 1944. All manufacturers of coal-mining equipment were assigned an AA-1 rating for the production of items now scheduled under L-269. "The mines, however, will continue to receive an AA-2X or AA-3 rating and the scheduling provisions of L-269 will control and determine the relative urgency of deliveries to them. . . . The change of rating structure means that the entire program

for the production of mining equipment will be assigned an AA-1 priority."

Wartime pressure for tonnage was a major factor in increased activity in adjusting methods and equipment in loading and auxiliary operations to insure the maximum performance per man and the lowest cost. One evidence of this trend was an increasing number of "special engineers" and production men charged with the responsibility of studying available methods and equipment, investigating suggested new ones and otherwise overhauling mining operations for more tonnage, a lower cost, higher quality and more safety now and in the future.

New Mines Mechanized

New deep mines were relatively few because of the principle of getting desired increases from existing operations and certain other quick sources, such as outcrop stripings, but nevertheless several were opened or started and others are projected. Practically all are based on the use of loading machines, conveyors or other mechanical equipment at the face. Even in development, mechanical equipment was used more and more in sinking slopes, in driving rock tunnels and in advancing headings both in coal and coal and rock.

In the new operations, belt slopes moved even farther into the foreground in territories where, in earlier

days, shafts would have been sunk. Improvement in belt construction and the possibility of using tandem belts were reflected in a trend to even longer slopes reaching to greater depths.

Auxiliaries Improved

Growing appreciation of the fact that maximum production from mechanical-mining units requires adjustment of all other equipment items and methods to machine loading or handling resulted in increased work in these auxiliary departments. In face preparation, for example, new cutting machines, new drills, new augers, new bits and new explosives or other coal-breaking mediums were installed as rapidly as available and more and more operations gave more attention to drilling patterns, shearing and other steps designed to facilitate preparing coal for loading. Cutting out bands or partings or cutting to eliminate draw-slate found increasing application, using both the conventional track-mounted machines and new-type hydraulically controlled overcutting shortwalls. This practice was accompanied, with increasing frequency, by machine handling and disposal of the cuttings.

Service to face equipment also got more of the attention it merits in 1943. Not only were more shuttle cars and conveyors installed but the trend toward big mine cars and better track was intensified. A companion activity was the adoption of additional

transfer stations to permit using big cars behind loading machines where shaft size or other considerations prevent hoisting them.

Additional belt and shuttle-car installations went into operation, and 1943 brought considerable progress in solution of the problem of discharging from cars to belts, which frequently requires some means of compensating for the difference between belt speed and coal-discharge rate. Many operations found a satisfactory solution in chutes, including special pivoted units operated by the travel of the cars for side loading, to put the coal on the belt in line with the travel. Others used elevating conveyors with storage hoppers or two-speed elevating conveyors with sufficient storage capacity to accommodate a full shuttle-car load.

Better Track Sought

Track layouts and track work in serving face equipment was another subject of increased study in 1943. Among other things, an American Mining Congress committee went into the question of random, pre-cut and pre-curved and fabricated track materials. With random material, costs per acre were estimated at \$375.33, no pillars recovered; \$348.13, room-and-pillar, pillars recovered; and \$316.30, block system, pillars recovered. Using pre-cut and pre-curved rails, estimated costs were, respectively, \$342.61, \$315.07 and \$267.52. With fabricated materials for track work, costs per acre were estimated still lower at, respectively, \$318, \$229.50 and \$262.28.

Main-haulage developments in 1943 were characterized by a rapid growth in the installation of treated ties and timber as a result of labor shortage and resulting tie and timber shortage.

While treated wood was harder to obtain, it was installed in most areas to the extent of available supplies.

In the field of employee transportation, imposition of portal-to-portal on coal mining under government pressure brought a rush of plans for and construction of new drift openings, slopes and shafts to reduce travel time and thus get more production for the hours paid for. With costs of hoists and other facilities, in addition to sinking costs, some shaft projects were reported to involve \$100,000 or more.

Ventilation Improved

But portal-to-portal was not the only criterion in making new openings. Ventilation, perhaps the subject of more recommendations by federal inspectors than any other mining activity, was the other. Outlying air shafts or openings to cut air travel, improve ventilation and reduce ventilating power were made at an increasing number of mines in 1943. Several went to two-fan systems, usually with each fan ventilating its own section, also to get more air to the face at a lower cost.

For the protection of air and haulage openings, largely the latter, considerable work was done on spraying mine roof with bituminous compounds. Investigation into the relation between technique, characteristics of the compounds used and the character of the roof material still was under way at the end of the year.

Clean-up work in mines also was affected by the labor shortage in 1943, with the result that in track cleaning, particularly, machines of various types were adopted for doing the job by power.

Cost-cutting possibilities in mine drainage were explored to an even

greater extent in the year just past. Much attention was directed to tackling the problem at its source: viz., keeping surface run-off out of the mines.

Underground ditches, boreholes through pillars and to the surface and other methods of reducing length of pipelines or eliminating them entirely were employed by additional properties. More deepwell turbine pumps were installed, and there was increased interest in the possibility of applying equipment with submerged motors, thus eliminating the long drive columns and other added facilities necessary with motors on the surface. A tight pipe situation and other considerations resulted in the successful installation of sewer-tile discharge lines in at least one operation (January Coal Age, p. 67).

Water Use Grows

In addition to improvements in ventilation, safety work also was characterized by a major increase in rock-dusting and use of water at the face. And the growth in sprinkling was accompanied by an active interest in reducing cost of getting water to the face. To avoid piping, a number of companies adopted tanks of various types, including both trailer units and tanks mounted on the machines themselves, especially shortwalls.

Gas removal to the surface by the use of boreholes and exhausters attracted increased interest in 1943 as a result of work already accomplished at a few southern mines. Several explosions from cutting into old workings focused attention on the need for better mapping, closer attention to control of advance work and longer exploratory holes ahead of and flanking workings approaching minc'd-out areas.

MECHANICAL-EQUIPMENT SALES ACTIVITY

By W. H. YOUNG,

R. L. ANDERSON, G. A. LAMB
and J. W. BUCH*

SALES of underground mechanical-loading equipment for use in bituminous coal, anthracite and lignite mines in the United States decreased in 1943 from 1942. In terms of capacity the 1943 sales were 32 percent less than

1942. Capacity of mechanical-cleaning equipment installed at bituminous mines was 45 percent less in 1943 than in 1942.

This survey was made possible by the courteous cooperation of all known manufacturers of mechanical loading and cleaning equipment in the United States, supplemented with data from various trade journals.

Preliminary estimates show that

mechanical loading of underground bituminous coal and lignite increased from 36.3 percent of the total output

* Messrs. Young, Anderson and Lamb are staff members of the Economics and Statistics Division, Solid Fuels Administration for War; Mr. Buch is Chief, Coal Economics Division, Bureau of Mines, U. S. Department of the Interior.

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in 1941 to 39.6 percent in 1942 and 42.4 percent in 1943. Bituminous coal mechanically cleaned increased from 22.8 percent of the total output in 1941 to 24.5 and 25.5 in 1942 and 1943, respectively. There are no mechanical-cleaning plants at lignite mines. Underground mechanical loading in Pennsylvania anthracite mines increased from 23.8 percent of the total output in 1941 to 24.5 percent in 1942 and decreased in 1943 to 23.9 percent of the total.

Table I shows bituminous coal and lignite production by methods of mining and the total output of mechanically cleaned coal for the years 1941-43, inclusive. Pennsylvania anthracite production by methods of mining is shown in Table II.

Mechanical-Loading Sales by Type
—Table III shows the units of mechanized loading equipment sold for use in underground bituminous coal, anthracite and lignite mines, as reported by manufacturers for the years 1936-43, inclusive. Sales of all types of mechanical-loading equipment showed a decrease in 1943 from the previous year.

Mobile-loader sales decreased from 352 in 1942 to 234 in 1943, or 33.5 percent. During the past eight years, this low figure was reached in only one year, namely 1940, when 233 units were sold.

Sales of scrapers decreased from 29 in 1942 to 15 in 1943, or 48.3 percent.

Conveyor sales also registered a decrease in 1943 from 1942, but it was a smaller percentage loss than any of the other types of loading equipment. Sales of conveyors decreased from 1,491 in 1942 to 1,100 in 1943, or 26.2 percent. Only one pit-car loader was sold during 1943.

Regional Distribution of Sales.—The total number of units of mechanical-loading equipment of all types sold in the various States and regions in 1943 is shown in Table IV. Types of equipment sold in approximate order of capacity are shown by letter symbol. For example, 127 mechanical-loading units of equipment were sold in Pennsylvania. In this total of units sold, mobile loaders (indicated by "L") furnished the largest addition to capacity and conveyors ("C") furnished the second largest, followed by scrapers ("S"). Capacities are based on actual performance as reported in 1942 by mine operators. Of all mechanical-loading equipment sold in 1943, mobile loaders furnished the greatest added capacity, with conveyors, scrapers and pit-car loaders following in the order named.

There were 1,046 mechanical-loading units sold for use in bituminous

and lignite mines and 304 for the anthracite mines, or a total of 1,350. In terms of capacity the sales of loading equipment for bituminous and lignite mines decreased 33 percent in 1943 from the previous year and sales for use in the anthracite mines decreased only 3 percent during the same period.

Types of Machines Sold Compared With Units in Use.—Table V shows the change in demand since 1934 for the different types of mechanical-load-

ing devices. Mobile loaders in active use at bituminous and lignite mines increased from 534 in 1934 to 2,315 in 1942. Scraper units in use show little change during the nine-year period, decreasing from 119 in 1934 to 100 in 1942. Pit-car loaders are rapidly being replaced by other types of loading equipment. Conveyors equipped with duckbills and other self-loading heads increased from 157 in active use during 1934 to 1,065 during 1942, and hand-loaded conveyors in-

TABLE I—BITUMINOUS COAL AND LIGNITE PRODUCTION BY METHODS OF MINING AND MECHANICAL CLEANING, IN THE UNITED STATES, 1941-43, INCLUSIVE

	1941		1942 ¹		1943 ¹	
	Thousands of net tons	Percent of total	Thousands of net tons	Percent of total	Thousands of net tons	Percent of total
Surface stripping.....	55,072	10.7	63,000	10.9	70,000	11.9
Hand loaded underground.....	272,410	53.0	287,000	49.5	269,000	45.7
Mechanically loaded underground.....	186,657	36.3	230,000	39.6	250,000	42.4
Total production.....	514,149	100.0	580,000	100.0	589,000	100.0
Mechanically cleaned.....	117,470	22.8	142,000	24.5	150,000	25.5

¹Preliminary.

TABLE II—PENNSYLVANIA ANTHRACITE PRODUCTION BY METHODS OF MINING 1941-43, INCLUSIVE

	1941		1942		1943 ¹	
	Thousands of net tons	Percent of total	Thousands of net tons	Percent of total	Thousands of net tons	Percent of total
Surface stripping.....	7,317	13.0	9,071	15.0	9,900	16.4
Culm banks and dredges.....	5,174	9.2	6,020	10.0	6,400	10.6
Hand loaded underground.....	30,435	54.0	30,495	50.5	29,627	49.1
Mechanically loaded underground.....	13,442	23.8	14,742	24.5	14,400	23.9
Total production.....	56,368	100.0	60,328	100.0	60,327	100.0

¹Preliminary.

TABLE III—UNITS OF MECHANICAL LOADING EQUIPMENT SOLD TO BITUMINOUS COAL, ANTHRACITE, AND LIGNITE MINES FOR UNDERGROUND USE IN THE UNITED STATES, AS REPORTED BY MANUFACTURERS, 1936-43, INCLUSIVE

	1936	1937	1938	1939	1940	1941	1942	1943	Percent change, 1943 from 1942
Type of equipment:									
Mobile loaders.....	344	292	241	292	233	368	352	234	-33.5
Scrapers ¹	28	29	10	26	39	11	29	15	-48.3
Conveyors ²	994	1,095	990	1,311	1,762	2,130	1,491	1,100	-26.2
Pit-car loaders.....	11	32	139	2	3	10	2	1	-50.0
Total, all types.....	1,377	1,448	1,380	1,631	2,037	2,519	1,874	1,350	-28.0
Number of manufacturers reporting.....	28	28	29	31	32	32	28	24	.....

¹Reported as scrapers or scraper haulers and hoists. ²Includes hand-loaded conveyors and those equipped with duckbills and other self-loading heads. Sales of both loading heads and shaker conveyors were counted for the years 1936-41, inclusive, but the figures for 1942 and 1943 do not include loading heads separately.

creased from 574 to 3,145 during the same period. Mechanical-loading equipment of all types in active use at bituminous and lignite mines as reported by mine operators increased from 3,672 in 1934 to 7,105 in 1942, or 94 percent, while all types in use at anthracite mines increased from 1,907 in 1934 to 3,015 in 1942, or 58 percent, during the same period.

Total sales of all types of mechanical-loading equipment sold to the bituminous and lignite industry in 1943 amounted to 1,046 units, which was 15 percent of the total number in active use in 1942, while the total number of units sold to the anthracite mines in 1943 was 304, or 10 percent of the total in use in 1942.

Types of Equipment Purchased by Regions.—Mobile loaders, scrapers and conveyors shipped into the various States and groups of States in 1943 and the estimated number of units in actual use in 1942 are shown in Table VI. West Virginia received the largest number of mobile loaders sold in 1943. All of the 234 mobile loaders sold in 1943 were shipped to bituminous and lignite mines.

There were 15 scraper units sold in 1943, of which the bituminous mines

TABLE V—SALES OF MECHANICAL LOADING EQUIPMENT IN 1943 COMPARED WITH TOTAL NUMBER OF MACHINES IN ACTIVE USE IN PRECEDING YEARS

	Number of machines in active use as reported by mine operators									Number of machines sold as reported by manufacturers in 1943
	1934	1935	1936	1937	1938	1939	1940	1941	1942 ¹	
Bituminous and lignite mines:										
Mobile loading machines	534	657	980	.....²	1,405	1,573	1,720	1,985	2,315	234
Scrapers	119	78	106	.....²	117	131	116	109	100	13
Pit-car loaders	2,288	2,098	1,851	.....²	1,392	873	697	607	480	1
Conveyors equipped with duckbills and other self-loading heads	157	179	234	.....²	346	559	656	788	1,065	.....³
Hand-loaded conveyors—number of units	574	670	936	.....²	1,526	1,834	2,263	2,807	3,145	798 ³
Anthracite mines (Pennsylvania):										
Mobile loading machines	14	1	.....⁴	.....⁵	.....⁵	.....⁵	.....⁴	.....⁴	.....⁴	.....⁴
Scrapers	617	507	504	539	546	535	547 ⁴	505 ⁴	524 ⁴	2
Pit-car loaders	25	22	.....⁴	.....⁵	.....⁵	.....⁵	.....⁴	.....⁶	.....⁶	.....⁶
Conveyors equipped with duckbills and other self-loading heads	13	30	.....⁴	.....⁵	.....⁵	.....⁵	.....⁶	.....⁶	.....⁶	.....³
Hand-loaded conveyors—number of units	1,338	1,563	1,790 ⁴	1,855 ⁵	1,831 ⁵	1,997 ⁵	2,189 ⁶	2,432 ⁶	2,491 ⁶	302 ³

¹Preliminary. ²Data for 1937 not available for bituminous and lignite mines. ³Sales of conveyors equipped with duckbills and other self-loading heads are included with hand-loaded conveyors. ⁴Mobile loading machines are included with scrapers. ⁵Mobile loading machines, pit-car loaders, and conveyors equipped with duckbills and other self-loading heads are included with hand-loaded conveyors. ⁶Pit-car loaders and conveyors equipped with duckbills and other self-loading heads are included with hand-loaded conveyors.

TABLE IV—TOTAL NUMBER OF UNITS OF MECHANIZED LOADING EQUIPMENT SHIPPED FOR USE IN EACH STATE OR REGION IN 1943

(L—Mobile loading machines; P—Pit-car loaders;
S—Scrapers; C—Conveyors)

State and region	Number of units of all types shipped in 1943	Types of equipment in approximate order of capacity in 1943
Northern Appalachian States:		
Pennsylvania	127	L.C.S.
Ohio	28	L.C.
Southern Appalachian States:		
West Virginia	381	C.L.S.
Virginia	23	L.C.S.
Kentucky	70	L.C.
Alabama	68	C.L.S.
Tennessee	17	L.C.S.
Middle Western States:		
Illinois	45	L.C.
Indiana	7	L.
Trans-Mississippi States:		
Arkansas, Oklahoma and Iowa	106	C.L.
Colorado	24	C.L.
Montana and Utah	96	C.L.
New Mexico, North Dakota, Washington and Alaska	18	L.C.
Wyoming	36	C.L.P.
Total bituminous and lignite	1,046	L.C.S.P.
Pennsylvania anthracite	304	C.S.
Grand Total	1,350	L.C.S.P.

TABLE VI—COMPARISON OF MOBILE LOADERS, SCRAPERS, AND CONVEYORS IN ACTUAL USE IN 1942 WITH SALES REPORTED IN 1943, BY STATES AND REGIONS

State and Region	Mobile loaders		Scrapers		Conveyors ¹	
	In use in 1942 ²	Sales in 1943	In use in 1942 ²	Sales in 1943	In use in 1942 ²	Sales in 1943
BITUMINOUS AND LIGNITE MINES						
Northern Appalachian States:						
Pennsylvania	475	52	12	5	865	70
Maryland					30	
Ohio	150	11			200	17
Michigan					5	
Southern Appalachian States:						
Alabama	55	12	50	1	340	55
Kentucky	180	15		1	370	54
Tennessee	5	9		1	105	7
West Virginia	550	63	5	1	1,300	317
Virginia	45	8		1	110	14
Middle Western States:						
Illinois	560	23			25	22
Indiana	140	7			10	
Trans-Mississippi States:						
Arkansas, Oklahoma and Iowa	155	34	33	3	850	242
Colorado						
Montana and Utah						
New Mexico, North Dakota, Washington and Alaska						
Wyoming						
Total bituminous and lignite	2,315	234	100	13	4,210	798
ANTHRACITE MINES						
Pennsylvania						
Grand total	2,315	234	624	15	6,701	1,100

¹Includes conveyors equipped with duckbills. ²Preliminary. ³Includes Arkansas, Colorado, Iowa, Montana, New Mexico, North Dakota, Oklahoma, Utah, Washington, Wyoming and Alaska. ⁴Mobile loaders included with scrapers. ⁵Includes pit-car loaders and duckbills or other self-loading conveyors.

received 13 and the anthracite mines only 2.

There were 798 conveyors sold for use in bituminous and lignite mines in 1943, of which West Virginia received 317, or 40 percent.

Trackless Gathering Equipment.—Although the sales of rubber-tired self-powered haulage units decreased in 1943 from 1942, deliveries were made in thirteen States in 1943 as compared with eight in 1942. Pennsylvania received the largest number of units in 1943 and Kentucky, West Virginia,

Alabama and Indiana followed in the order named. These units, generally known as "shuttle cars," are used to transport coal from mobile loaders to a transfer station on the haulageway. During 1942 approximately 15 percent of the coal loaded by mobile loaders was handled by shuttle cars.

Sales of Mechanical Cleaning Equipment for Bituminous Coal.—The total capacity of mechanical-cleaning equipment sold for use at bituminous-coal mines in 1943 was estimated at 3,500 net tons of cleaned coal per hour as

compared with 6,400 net tons in 1942. Installations were made in ten States in 1943 and nine States in 1942. Some of this equipment sold in 1943 will not be placed in operation until early in 1944. In terms of capacity, about 40 percent of the installations were made at mines that had no cleaning facilities and the other 60 percent were made as additions to or replacement of equipment at mines that already had cleaning plants. Installations in 1943 were greater in Pennsylvania than in any other State.

COAL STRIPPING

STRIPPING tonnage reached a new high in 1943. The output of existing stripings using both small engine-powered and large electric equipment was boosted in the year just past. In addition, numbers of new outcrop stripings were opened, particularly in the Appalachian territory, to quickly supplement deep-mined production. This expansion was made possible by using facilities made available by decreased road building and construction, plus additions, as far as supplies were available, to equipment in the hands of concerns already in the business. Shovels were the most-applied stripping medium, but a number of outcrop stripings turned to draglines and several employed tractor-powered scrapers. Draglines also were adopted at several new moderate-sized stripings in the Middle West.

Installations of large electric stripping or loading shovels or draglines were in the minority in 1943, although several units on which work was started in 1942 went into operation in 1943, including two 25-cu.yd. draglines in northern Illinois and a 20-cu.yd. shovel with 133-ft. boom, 90-ft. dipper handle and a clear dumping radius of 153 ft. in Montana. It was accompanied by a converted loading shovel with 15-cu.yd. dipper and two 1,000-hp. diesel-electric locomotives. Both shovels were equipped with amplitidyne control, insulated cabs and filtered air.

New Controls Installed

In addition to amplitidyne, "Rototrol" and similar controls on new equipment, a number of existing stripping and loading shovels and draglines were converted to such controls in 1943 to increase production and reduce maintenance. This same type of equipment also offered advantages in power-factor regulation in several instances,

materially reducing line-voltage fluctuations and in at least one case saving the installation of additional copper to feed new equipment.

The walking dragline, both in large and 5- to 8-cu.yd. sizes, found increased popularity in 1943, either as a production machine or as a utility unit where other and larger equipment was employed. Several new loading shovels went into service, including some 5- and 7½-cu.yd. models with minor improvements as well as dual swing-crowd generators to reduce cab-room requirements.

Electrical service to stripping equipment was marked by increased use of ground-protective devices to minimize the possibility of shock in case of cable and other faults. One mine, at least, has adopted 3-phase transformers for its field substations. Compactness and a reduction in exposed wiring are cited as leading to lower-cost installation and greater safety.

Haulage Active in 1944

Haulage as much as anything, and perhaps more, was the subject of attention at stripping operations in 1943. In a few instances, pit operations were consolidated and field-preparation plants were installed to improve transportation and provide other economies and advantages, including taking part of the burden off the regular preparation plant by picking in the field.

Automotive equipment held its position as the leading haulage medium at stripping operations, although there was a growing trend toward the use of tractors and trailers in the pit and rail haulage from a field transfer station to the preparation plant. Size of trucks and semi-trailers again showed an increase, in line with past trends, with even some of the smaller operations going to straight

trucks with capacities of 13 to 15 tons or more. Diesel power marked up additional gains, and there was growing evidence that the fluid drive might become the next major accessory.

Several rail hauls also went to larger equipment or at least made plans for it. The limit in car capacity apparently was the railroad standard, while diesel or diesel-electric locomotives up to 65 tons or more registered gains.

Truck Roads Improved

Grade elimination in both truck and rail hauls found more adherents than ever in 1943. In several cases, reconstruction of truck roads was based on keeping maximum grades less than 2½ or 3 per cent. Character of truck roads was the object of more intensive study in 1943, reflecting growing appreciation of the fact that good roads speed haulage and materially reduce equipment maintenance. More and more well-graded and drained highways with ample width and good subgrades and running surfaces were built. Maintenance got equal attention and additional equipment was installed for this purpose, including sprinklers and road patrols. Particular attention was given to waterproofing at several operations, with bituminous compounds the most popular. At one plant, as an example, the top dressing, applied in two coats, consisted of $\frac{1}{2}$ gal. of bituminous compound and 30 lb. of $\frac{1}{2} \times \frac{1}{2}$ -in. stone chips per square yard, rolled after each application. With the tire situation what it was and is, good roads were considered increasingly important from that standpoint alone if for no other.

New and improved shops and tighter inspection and preventive maintenance also reflected the tight situation in repair parts and materials.

ELECTRIFICATION AND MAINTENANCE

"PROGRESS in spite of shortages of material and skilled men" should be inscribed on the electrical and mechanical milestone planted by the coal industry at the end of the second full year of war. As might be expected, new developments were limited, but even so a few did come to light.

Top-management interest, created in part by the wide publicity given to preserving equipment, no less than the drive for more tonnage, was responsible for the maintenance gains marked up in 1943. With some coal companies, the chief electricians and master mechanics, for the first time, got action on long-standing recommendations for better accommodations and equipment for carrying on inspection, running repairs and periodic overhauls.

Voltage Changes Made

Due to the material and labor situations, probably not many mines changed from 2,300 to 4,000 volts in 1943 but that was no sign of decreased interest. Some attained the goal, however; one, at least, completing the second and final step last summer (November, 1943, *Coal Age*, p. 64). It included relocation of certain outdoor substation equipment—a step taken by several other operations without a change in voltage to get the equipment close to the load center. Decentralization of 2,300- and 4,000-volt stations attracted increasing consideration as a means of saving copper in secondary circuits.

While the number of large new mines going into operation was limited, one big one installed its own 3-phase 60-cycle 44,000/2,400-volt substation, which included 69,000- and 7,500-volt insulation-level hardware to guard against excessive coal-dust collections in an arid region. Other facilities included a 46,000-volt remotely controlled oil circuit breaker; three 1,250-kva. transformers (fan-cooled to increase capacity 25 percent) with external tap changer; 600-kva. step-voltage regulator (15 percent buck or boost); 1,440-kva. capacitor with four-step automatic switching to maintain unity power factor at all loads (at power company's insistence), plus differential and overload relay protection, single-phase relay protection under both heavy- and light-load conditions.

high-voltage back-up fuses and lightning arresters.

Solenoid-operated (from 125-volt battery) 5,000-volt metal-clad air circuit breakers for 2,400-volt station-bus and feeder-circuit switching featured indoor a.c. installations at this same operation. All breakers have overload protection (induction-type relay) and all circuits are metered for power-accounting purposes. Electrical construction also was featured by a new fabricating material, a light U-shaped section of rolled steel with numerous fitting accessories, which found increasing application at other properties as well. Popular uses were: mounting electrical bus hardware and motor starters; conduit, cable and pipe support; stock-bin construction, etc.

Service to secondary transformer stations and conversion units and to equipment was marked by increased stress on reliability in addition to other normal considerations. In one case it was found advisable to install duplicate cables in twin boreholes to supply two underground fans, each cable being large enough to supply both the fans if necessary. In another case, the two cables supplied a.c. power for practically all the coal production.

Rectifier Use Increases

Mercury-arc rectifiers moved still further into the forefront as a source of d.c. power. Installations were made all over the United States, and one company in the South was reported to have ordered or installed thirteen 300-kw. units to take care of rapid conversion to mechanical mining. Both the pumped- and sealed-type units found favor in the field, with the sealed-type apparently leading in the latter part of the year. Portable sets were more numerous and new types were brought out during the year. At least one manufacturer announced that portable rectifiers had been standardized for ratings up to 500 kw., 275 volts.

Transformers installed with rectifiers were divided among the regular, askerel-filled and recently introduced dry-type units, with flameproof or dry transformers for underground service. The same trend toward flameproof or dry-type transformers for other a.c. loads, particularly underground, was noticeable in 1943, some companies

now having considerable numbers of askerel-filled units in service.

In some rectifier installations, additional voltmeter equipment on the incoming-line side was requested to permit entirely isolating the indication of transmission-circuit trouble from that of the control and auxiliaries of the rectifier.

Copper in Short Supply

Shortages of labor and copper held down progress in d.c. distribution, but many operations did manage to reduce power losses and improve face voltage by moving substations and/or adding copper. Moving stations, in fact, was about the only out in many cases, but numerous organizations failed to get the copper and extra labor necessary to keep distribution in step with high production and consequent rapid lengthening of transmission distances.

Where boreholes are employed to feed working sections, some companies revised or improved practices for greater reliability and safety. One company using concentric cables without wire armor but employing the outer conductor for suspension now wraps each conductor around an insulated pipe to carry the weight. The outer conductor is grounded to the borehole casing at the top and bottom of the hole so that there is no danger of burning the wires if the cable should fall. The cables, 2,000,000 cir.mil and about 500 ft. long, are very heavy.

One mine, at least, was operating on a 275-550-volt three-wire system in 1943. This step, including revision of d.c. substation facilities and circuits, was taken to improve voltage without adding copper (July, 1943, *Coal Age*, p. 65). The property in question was operating, at that time, one shuttle-car section and two 6-ton locomotives.

Spirited discussion of the question of frame grounding was touched off by suggestions that as a war measure and perhaps as a lasting arrangement solid electric grounds to frames of d.c. equipment operating on the mine bottom, such as shortwalls, be eliminated as a questionable safety measure (December, 1943, *Coal Age*, p. 73). Just as strong a stand on the opposite side was taken by a number of authorities and meanwhile frame grounding continued to increase. At one operation using a rectifier-fed d.c. system with the posi-

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tive at ground potential, the ground wire from each machine is carried back separately through the distribution box to the first 500,000-cir.mil junction box, where it is purposely grounded to the positive side of the circuit. It was felt that if the ground wire were made a part of the d.c. circuit at this point there would be less chance of the ground connection becoming unknowingly isolated as a result of an open circuit.

In this same mine, to match the permissibility already incorporated in the machines operating in conveyor-mining territories on the "raises," special attention was given to the 275-volt distribution circuit. Cut lengths (standard 75- and 300-ft. sections) of extra-flexible stranded rubber-insulated 500,000-cir.mil cables were equipped at the factory with threaded swivel make-up connectors. Gang-type junction boxes serve at the points where branch runs take off. The latter feed their respective machines through permissible distribution boxes with fuse protection for each individual machine circuit.

What to do with the extra length of a floor cable, such as the trailing cable on a shortwall in conveyor mining, received considerable attention from the standpoints of cable preservation, fire prevention and convenience. Sectionalizing increased and with it the idea of shorter main cables on machines, with consequent advantages from the standpoints of heating, voltage drop and the like, using auxiliary cables where it is necessary to operate at more than the normal distance from the d.c. power connection. New junction boxes were introduced to facilitate cable sectionalizing.

Synthetic for Cables

Cable developments also were characterized by a widespread use of synthetic rubber and a major increase in attention to vulcanizing for conservation. Vulcanizing synthetics was the object of much study in 1943, with most of the manufacturers expressing the opinion that with the right technique it offered few, if any, different problems from vulcanizing natural rubber. The same stand, incidentally, was taken on synthetic-rubber conveyor belts.

With conservation a critical item, more attention was given to the problem of making cable joints as strong, as small in size and as flexible as the original conductor. Factory methods (July, 1943, *Coal Age*, p. 67) were studied by more and more coal companies, along with methods already in use, including swaging on a copper sleeve with a blank-cartridge-powered tool. The latter also was found advan-

tageous for machine wiring, especially where joints must be made in corners or other close quarters.

Sectionalizing d.c. circuits with switches and breakers, the latter in semi-automatic and reclosing types, continued to gain favor in 1943. And one operation continued work toward completely equipping the feeds to all trolley wires with hand-reset breakers with dual overcurrent trips to handle short-time peaks yet protect the wires against heating and annealing in case of sustained overload (June, 1943, *Coal Age*, p. 76).

Shop methods and maintenance practices showed a definite improvement in 1943. The advances ranged all the way from shop lighting based on a system employed around airplane hangars (a mixture of 750-watt incandescent and 400-watt mercury-vapor lamps, all of the high-bay type, installed over the traveling crane to give a well-blended light for close machine work on the night shift), through new varnishes requiring no solvents to better inclosures for motor starters.

Maintenance Improved

Attention focused on better maintenance and job training raised the quality of workmanship and brought about the introduction of new tools and methods in many shops, large and small. More comfort for shop workers was the rule. Several groups of mines consolidated certain classes of work at central shops to get the advantages of better facilities and expert supervision. Along with this trend also was a trend toward more and better-equipped shops underground near the working sections for certain types of repairs and overhauls at mechanical mines. In spite of the increased strain on machinery and other conditions that generally mean more trouble, many companies were able to reduce equipment failures to new lows.

To facilitate supply service and improve maintenance numerous organizations overhauled warehousing and delivery facilities and built special supply cars and maintenance trucks. One mine, as an example, ended the year with 59 special cars and trucks for supply service and maintenance under three-shift operation.

No small part of the improvement in coal-mine maintenance in 1943 was due to better management extending from the top down to the foremen. A number of coal-mining operations hung up new records in such activities as reduction of armature failures. Losses of production time as a result of machine breakdowns also were cut materially at many operations.

With other improvements in electri-

cal maintenance, there was a trend toward better inclosures for motor starters, in part due to the scarcity of good maintenance men and the fact that dirty conditions lead to trouble. More users are buying dust-tight (not just dustproof) and even water-tight inclosures. The latter, with a rubber-gasketed seal, is considered the most effective of all. While a better inclosure requires more time to open and close, visits to such starters are materially reduced if not practically eliminated.

Totally inclosed ball-bearing fan-cooled high-torque squirrel-cage motors enjoyed wider usage in the year just past. It was noted that such inclosures not only protected the units under the usual service conditions but proved to be life-savers in the cases of new plants where the rush to put them into service resulted in installation of roofing and siding lagging behind equipment installation.

Metal spraying now stands where arc welding did a decade ago. In other words, it is just on the threshold of what promises to be an active future in coal mining. Numerous coal shops now have these machines to build up metal parts of all kinds without heating, and are finding the range of applications as well as learning the limitations of the process. In the field of arc welding, filling the treads of worn tires gained additional ground. All methods continued in use: banding, complete filling by hand and filling by automatic welding heads. Building up tires without removing the trucks from the locomotives and without smoothing by grinding or turning continues to have a wide following at the medium to small mines.

Heat-Treating Next

Heat-treating furnaces with accurate temperature controls and pyrometers constitute the next logical step for central shops of the larger companies and the past year was notable for activity in that direction. With such equipment, there would seem to be no necessity for throwing away any worn or broken part. Worn treads on crawler trucks, for instance, could be rebuilt and heat-treated to restore their original hardness. By accurate heat treatment, alloy steels can be reworked and restored to original strength and toughness.

Although 1943 was marked by a pinch in the delivery of some types of anti-friction bearings, many coal companies were able to make progress in their programs of converting all old sleeve-bearing electric motors to anti-friction types. Several manufacturers and service companies were active in

supplying parts, end-bells and other necessary items.

Lubrication also improved in 1943 under pressure for continuity of machine operation for maximum tonnage. Better methods of handling, storing and transporting lubricants were adopted; lubricating methods were studied and revised for maximum efficiency; better closures, seals and re-

tainers were installed to keep the lubricant in place and prevent waste and failures; and increased attention was given to fitting the lubricant to the job, not to mention a strong trend to using the best quality oils and greases.

Among the new aids to maintenance were V-belts and steel-wire inserts. Glass plates for lining chutes in preparation plants (November, 1943, *Coal*

Age, p. 94) were installed by numerous companies toward the end of the year. Many others found brick and gunite linings for chutes and gunite for tanks, cones, etc., a worth-while method of lengthening life and reducing replacements. The shortage of tin for babbitt resulted in the development of a silver babbitt said to have all the good properties of the tin-base type.

COAL PREPARATION

A WAR-ENFORCED slowdown in installation of new equipment marked bituminous preparation in 1943, although the urge still was there and activity was showing signs of picking up at the end of the year. Anthracite, on the other hand, enjoyed an active year in new equipment—largely for the beneficiation of buckwheat, rice, barley, No. 4 and No. 5. The so-called "independent" producers took the most of the equipment.

Coal-washing tables led the list of anthracite installations. By sizes, installations were: pea, 2; No. 1 buckwheat, 10; rice, 7; barley, 16; No. 4, 25; No. 5, 4; unspecified 3. Classifiers acquired for fine sizes included two for No. 5. Washer installations for buck and smaller were: No. 1 buckwheat and rice, 1; No. 1, rice and barley, 1; No. 1 buckwheat, 5; rice, 4; barley, 8; No. 4, 7; No. 5, 2. Anthracite installations for pea and larger were few.

The stream-pollution question also played a part in anthracite preparation developments in 1943. This question, plus a desire to capitalize on sales possibilities, was behind a pilot froth flotation plant at one operation which will serve as a guide for the construction of a full-scale plant for recovering and treating washery-water solids.

Salvage Interest Grows

Bituminous operators also showed a greater interest in salvaging and preparing the finer sizes and slurry. Several table installations were made for this purpose. Other slurry recovery and handling facilities included continuous centrifugal dryers for dewatering and/or cleaning. In one instance, 10-mesh slurry-preparation equipment included launder-type cleaning facilities and special vibrators for dewatering, after which the slurry is combined with dewatered washed screenings for final heat-drying.

Mines for metallurgical or special-purpose coals figured prominently in installations of complete plants or

New Bituminous Preparation Facilities in 1943*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
Alabama By-Products Corp.	{ Praco, Ala. Praco, Ala. (16)	{ 400 144	Link-Belt ¹ Deister Concentrator ²
Algoma Coal & Coke Co.	Algoma, W. Va. (2)	175	Roberts & Schaefer ³
Antioch Power Co.	Linton, Ind. (2)	30	Deister Machine ⁴
Butler Consolidated Coal Co.	Wildwood, Pa.	75	McNally-Pittsburg ⁵
Central State Collieries, Inc.	St. David, Ill.	20	Link-Belt
Christopher Mining Co.	Four States, W. Va.	400	Fairmont
Coal Processing Corp.	Dixiana, Va.	125	Kanawha
Columbia Steel Co.	Columbia, Utah	900	Allen & Garcia
Consolidated Coal Co.	Herrin, Ill.	75	McNally-Pittsburg ⁶
Consolidation Coal Co. (No. 38)	Fairmont, W. Va.	25	Fairmont
Dering Coal Co.	Eldorado, Ill.	450	McNally-Pittsburg ⁷
H. E. Harman Coal Corp.	Harman, W. Va.	50	Fairmont ⁸
Hanna Coal Co.	Piney Fork, Ohio	300	Link-Belt
Harlan-Wallins Coal Corp. (No. 2)	Verda, Ky.	250	Jeffrey
Huntsville-Sinclair Coal Co.	Huntsville, Mo.	100	McNally-Pittsburg
Imperial Smokeless Coal Co.	Quinwood, W. Va. (2)	60	Kanawha ⁹
Leckie Smokeless Coal Co.	Anjean, W. Va.	15	Deister Machine ⁴
Marigold Coal Mining Co.	Jasper, Ala.	400	McNally-Pittsburg ⁸
Mauger Construction Co.	Pond River, Ky. (2)	8	Deister Concentrator ²
Montana Coal & Iron Co.	Washoe, Mont. (2)	200	McNally-Pittsburg ⁹
McAlester Fuel Co.	Carbon, Okla.	200	McNally-Pittsburg ⁹
Monroe Coal Mining Co.	McCurtain, Okla.	50	Roberts & Schaefer ¹⁰
Panther Red Ash Coal Corp.	Panther, W. Va.	135	Kanawha ⁷
Peerless Coal & Coke Co.	Vivian, W. Va.	400	Roberts & Schaefer ¹¹
Pekin Mining Co.	Vivian, W. Va.	30	Kanawha
Pennsylvania Coal & Coke Corp.	Pekin, Ill.	200	Deister Machine
Premier Pocahontas Collieries Co.	Ehrenfeld, Pa.	200	Link-Belt ¹²
Princess Elkhorn Coal Co.	Premier, W. Va.	65	Kanawha ¹³
Raleigh-Wyoming Mining Co.	David, Ky.	125	Link-Belt
Rochester & Pittsburgh Coal Co.	Edwright, W. Va.	300	Kanawha ¹⁴
Ruthbell Coal Co.	McIntyre, Pa.	200	Heyl & Patterson ¹⁵
Steubenville Coal & Mining Co.	Albright, W. Va.	100	Fairmont
Sooner Coal Mining Co.	Steubenville, Ohio	200	Deister Machine
Sunlight Coal Corp.	Oolah, Okla.	200	McNally-Pittsburg ⁹
Truax-Traer Coal Co.	Boonville, Ind.	300	McNally-Pittsburg ⁹
United States Fuel Co.	Fiat, Ill.	75	McNally-Pittsburg ⁹
Utilities Elkhorn Coal Co.	Hiawatha, Utah	265	Link-Belt
Utah Fuel Co.	Pikeville, Ky.	25	Link-Belt ¹⁶
W. L. Purseglove Coal Co.	Sunnyside, Utah	150	Link-Belt ¹⁶
Wallace Coal Co.	Wilsonburg, W. Va.	250	Fairmont
West Gulf Coal Co.	Marion, Ill.	80	Deister Machine
West Kentucky Coal Co. (No. Diamond)	Maben, W. Va.	168	Kanawha
West Virginia Coal & Coke Corp. (No. 5)	Earlington, Ky. (2)	350	Roberts & Schaefer ¹⁷
Windsor Power House Coal Co.	Omar, W. Va.	168	Fairmont ⁸
Woodward Iron Co.	Power, W. Va.	350	Roberts & Schaefer ¹¹
	Woodward, Ala.		Deister Machine

*Includes additions and installations of preparation equipment in existing structures. Where more than one unit of preparation equipment was installed, the number appears in parentheses after the plant address.

¹Complete preparation plant, including Link-Belt air-pulsated washer. ²"SuperDuty" diagonal-deck coal-washer tables. ³Hydro-separator, 130 t.p.h.; Hydrotator, dry-plant middlings, 40 t.p.h. ⁴"Plat-O" coal-washing tables. ⁵McNally-Norton unit washing equipment and auxiliaries.

⁶Includes Chance-cone equipment. ⁷Kanawha-Belknap washers or K-B washers and other equipment. ⁸Including two McNally-Norton auto-

matic washers and McNally-Carpenter centrifugal dryers. ⁹Including McNally-Norton automatic washing equipment. ¹⁰Stump Air-Flow cleaner and auxiliaries.

¹¹Tandem hydroseparators washing plant and auxiliaries. ¹²Including two Kanawha-Belknap washers. ¹³Includes Chance-cone equipment, 225 t.p.h., furnished by Fairmont for new plant. ¹⁴Sludge-recovery, screening and drying addition, including McNally-Rheo fine-coal washers. ¹⁵Dust-collecting system.

¹⁶Slurry-drying installation, including C-M-I continuous centrifugal dryer. ¹⁷Hydrotator washer and classifier and accessories.

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New Anthracite Preparation Facilities in 1943*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
American Briquet Co.	Pine Grove, Pa. (6)	50	Deister Concentrator ¹
Branch Coal Co.	Llewellyn, Pa. (4)	...	Deister Concentrator ¹
Central Construction & Supply Co.	Harrisburg, Pa. (8)	100	Deister Concentrator ²
Colitz Coal Co.	Pottsville, Pa.	6	Deister Concentrator ²
Colyar Co.	Mt. Carmel, Pa. (3)	43	Deister Concentrator ²
Concentrated Coal Co.	Nesquehoning, Pa. (5)	25	Deister Concentrator ²
Delano Anthracite Collieries Co.	Mahanoy City, Pa.	350	Chance ¹⁰
Eagle Hill Coal Co.	St. Clair, Pa. (2)	25	Deister Concentrator ¹
Equitable Fuel Corp.	Dunmore, Pa. (3)	35	Deister Concentrator ²
Gilberton Coal Co.	Gilberton, Pa. (3)	150	Wilmot ¹¹
Haven Coal & Supply Co.	Reynolds, Pa.	8	Deister Concentrator ²
Hazle Brook Coal Co. (Midvalley)	Wilburton, Pa. (2)	110	Wilmot ¹¹
Indian Head Coal Co.	Tremont, Pa. (6)	180	Finch Mfg. Co. ⁵
Jeddo-Highland Coal Co. (No. 7).	Harleigh, Pa. (3)	175	Wilmot ¹¹
Jermyn-Green Coal Co. (No. 14).	Pittston, Pa. (2)	40	Wilmot ¹¹
Jonathan Coal Mining Co.	Barry, Pa.	10	Deister Concentrator ²
Jonathan S. Reber.	Deibler, Pa. (2)	16	Deister Concentrator ²
Jones Coal Co.	Bowmanstown, Pa.	7	Deister Concentrator ²
Landene Corp.	Middleport, Pa. (9)	115	Deister Concentrator ²
Locust Coal Co.	Hauto, Pa. (6)	200	Wilmot ¹¹
Lower Region Coal Co.	Shenandoah, Pa. (3)	28	Deister Concentrator ²
Locust Valley Coal Co.	Shamokin, Pa.	20	Wilmot ¹¹
M. & S. Coal Co.	Morea, Pa. (2)	15	Deister Concentrator ²
Millersville Coal Co.	Minersville, Pa. (3)	30	Deister Machine ⁸
Mineral Spring Coal Co.	Minersville, Pa.	12	Finch Mfg. Co. ⁵
Monshan Coal Co.	Millersville, Pa. (3)	140	Finch Mfg. Co. ⁵
Otto Collieries Co.	Wilkes-Barre, Pa. (4)	88	Finch Mfg. Co. ⁵
Raymond Wren.	Forksville, Pa.	15	Wilmot ¹¹
Repffer Coal Co.	Branchdale, Pa.	300	Chance ¹¹
Rhoads Contracting Co. (Park No. 1).	Williamstown, Pa. (4)	30	Deister Concentrator ²
Rubin Coal Co.	Buck Run, Pa.	105	Wilmot ¹¹
Ryon Coal Co.	Park Place, Pa.	65	Wilmot ¹¹
St. Clair Coal Co.	Forest City, Pa.	...	Deister Concentrator ²
Steam Coals, Inc.	Pottsville, Pa. (2)	15	Deister Concentrator ²
Sunshine Coal Co.	Pottsville, Pa.	15	Deister Machine ⁸
Susquehanna Collieries Co. (Glen Burn).	St. Clair, Pa. (4)	300	Wilmot ¹¹
T. F. Steel Coal Co.	Shamokin, Pa.	15	Deister Concentrator ²
Tunnel Ridge Coal Co. (Candlemas).	Trevortown, Pa.	15	Wilmot ¹¹
Waddell Coal Mining Co.	Junedale, Pa.	30	Deister Concentrator ²
Winton Coal Co.	McAdoo, Pa.	15	Wilmot ¹¹
	Winton, Pa. (3)	35	Deister Concentrator ²
	Tamaqua, Pa.	15	Deister Machine ⁸
	Tamaqua, Pa.	8	Deister Concentrator ²

*Includes contracts for installation of preparation equipment in existing structures. Where more than one unit of preparation equipment was installed, the number appears in parentheses after the plant address.

¹"SuperDuty" diagonal-deck coal-washing table equipment with "Concenco" revolving-feed distributor. ²"SuperDuty" diagonal-deck coal-washing table equipment. ³Type E Simplex jig equipment. ⁴Hydrotator coal-washing equip-

ment. ⁵Menzies cone-separator coal-washing equipment.

⁶Type D Simplex jig equipment. ⁷New preparation plant for bank coal: one Chance cone, four Hydrotators; one Wilmot classifier. ⁸"Plat-O" coal-washing table equipment. ⁹Type A Simplex jig equipment. ¹⁰Chance cone equipment transferred from another breaker; capacity, range, 250 to 350 t.p.h. ¹¹Wilmot classifier with high-speed dewatering screen.

major cleaning installations, although non-specialty properties, including strippers, held their own. A number of mechanical cleaners went in for single sizes or groups of sizes and some companies supplemented equipment for large coal with units for the smaller sizes as well.

Re-treatment Increases

Re-treatment of jig refuse, usually after crushing, was the objective in several table installations. Other types of mechanical cleaners also were installed for salvaging coal from picking-table or primary-washer rejects or from crushed bony coal or mine refuse.

The vibrating screen and crusher continued to find favor in the coal industry, along with the rescreening plants in which they have figured so prominently in recent years. Shaker-type screens also were installed to improve coarse-coal sizing at a number of plants, along with conveyors, elevators and other auxiliaries for handling and transferring coal in preparation.

The trend toward storage bins ahead of preparation plants continued in 1943, along with the trend toward increased crushing and rescreening. Dustproofing developments were marked by a swing to calcium chloride and other hygroscopic mediums, with calcium chloride for freezeproofing taking another jump during the year. Late in 1943, operators were permitted to use residual fuel oil and other refining residues for dustproofing, but the relief in many cases was more apparent than real, due to difficulties in getting supplies, in applying the oils and in the fact that they frequently were unsuited to the types of coals produced.

FEDERAL INSPECTION

By Dr. R. R. SAYERS,

Director, U. S. Bureau of Mines

IN DECEMBER, 1943, the coal-mine inspection program of the Bureau of Mines, United States Department of the Interior, entered its third year in serving what I choose to call America's "No. 1 War Industry"—more than 7,500 producing coal mines employing nearly 600,000 persons.

A year ago when I reported on the progress of the coal-mine inspection work of the Federal Government I predicted that its beneficial aspects would be more pronounced during the year

then to come. Events of 1943 have borne this out and the Coal Mine Inspection Division of the Bureau has entered 1944 with renewed enthusiasm in its field of endeavor: the promotion of health, safety and efficiency in coal mines, large and small.

There are two methods for depicting the progress of federal inspection activities. One is by a straight-from-the-shoulder presentation of actual accomplishments as reflected by the improvements made in various mines, betterments for which management, labor and state inspection agencies must share credit. Another is by the introduction of statistics. In reviewing the

achievements of the federal inspection program for 1943 I will use both systems to give a more complete résumé.

During 1943, federal coal-mine inspectors made initial inspections of 1,167 coal mines, surface and underground, in 24 states. In addition, they re-inspected 409 mines. During the preceding year, 1942, the inspectors visited 778 operations. No re-inspections were made that year. A recapitulation shows, then, that since the program started with the first official inspections in December, 1941, the Bureau has made initial inspections of 1,945 coal mines and has re-inspected 409 of them to observe improvements

COAL MINE INSPECTION ACTIVITIES, U. S. BUREAU OF MINES, CALENDAR YEAR 1943

	Mines Receiving Initial Inspections	Mines Reinspected	Explosives Surveys Conducted	Electrical Surveys Conducted	Explosives Storage Facilities Inspected	Safety Meetings Attended	Assistance Given At Mine Fires And Explosions	Miscellaneous Accidents Investigated	Scrap Metal Investigations For War Production Board	Special Investigations	Special Trips Underground and Through Surface Plants
District A	337	92	7	5	305	152	15	12	5	41	29
District B	49	...	10	0	42	3	2	3	0	5	2
District C	386	83	0	0	267	80	11	10	62	56	18
District D	52	6	0	0	42	23	11	2	0	7	20
District E	255	202	10	3	417	22	5	2	170	33	25
District F	12	8	0	0	14	4	1	2	0	0	6
District G	19	0	0	0	21	21	1	2	3	5	12
District H	57	18	10	6	87	16	15	8	3	30	46
Total	1,167	409	37	14	1,195	321	61	41	243	177	158

District A—Pennsylvania bituminous, Maryland, Ohio, and northern half of West Virginia; District B—Pennsylvania anthracite; District C—Virginia, southern half of West Virginia, eastern half of Kentucky; District D—Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Florida; District E—Eastern half of Nebraska, Iowa, Illinois, Indiana, Western half of Kentucky, Missouri; District F—Michigan, Wisconsin, Minnesota, North Dakota, and eastern halves of South Dakota and Nebraska; District G—Western halves of South Dakota and Nebraska, Montana, Colorado, New Mexico, and all States to the west.

and to offer further suggestions for safeguarding life and property. Most of the production comes from about 1,500 of the larger mines in the nation, and the Bureau has reached virtually all of these. The re inspections reveal that this cooperative program is succeeding and making steady progress toward its objectives despite the wartime adversities faced by the industry. These include labor turnover, an influx of new workers unskilled in mining, loss of irreplaceable workers to war plants, bad weather, inability to obtain replacement parts for old equipment and slow deliveries on orders for new equipment, reopening of old workings with resultant increases in hazards, and accelerated production. Yes, even the "flu" epidemic and other illness must be included among the industry's problems of last year.

Mines Made Safer

Yet in the face of these setbacks the coal-mining industry approached its 1942 record output and counted steady progress in making mines safer places in which to work. This statement is based upon the 409 re inspections made by the Bureau. In each mine re inspected, some improvements had been made in operating practices and conditions since the first inspection several months earlier. Bureau records show that many mines made 20, 30 and even

more specific improvements. Tentative figures of the Bureau of Mines indicate that the number of men injured in 1943 decreased both in bituminous and anthracite operations and that the accident-frequency rate per million tons also dropped. Thus, the improvements described in the re inspections are reflected in the accident records of the industry and they show that progress is being made in the battle against accidents.

Ventilation Improved

The improvements being made in the nation's coal mines are described in detail in the Bureau's re inspection reports on file in Washington, D. C., and in the district offices, and for the most part, the betterments involved major changes. New ventilating fans were installed in many mines to increase the volume of air, safeguards were added to lessen the chances of sudden shutdowns in ventilating facilities, aircourses were cleared of falls and new courses were driven, dangerous booster fans and portable blower fans were removed and more air was provided in working places through improved aircourses, line brattice installations were made more effective, stoppings were made airtight, new openings were driven, and fireboss examinations became more thorough and more frequent.

I mention ventilating improvements first because the Bureau's inspection of nearly 2,000 of the larger coal mines of the United States shows that the maintenance of adequate ventilation is one of the principal problems from an over-all safety standpoint.

Falls Curbed

Falls of roof and coal and haulage accidents are the leading causes of injury in the mines, yet our inspectors report gradual progress toward curbing these dangers. One mine I might mention was in a sad state of repair when it was visited originally. Today it is a model of good timbering and good roof-testing practices, and its workers are proud of their record of no lost-time accidents from roof falls since the first federal inspection. Equally impressive are the steps taken to prevent haulage accidents. Clearance has been improved in scores of mines, tracks have been relaid, stumbling hazards removed and shelter holes driven for the first time in dozens of mines. Haulage accidents have declined in those mines as a direct result of these betterments and the adoption of safer haulage practices.

The re inspection reports disclose other evidence of an increasing regard for safety. More mines are being rock-dusted today than ever before, better dust-control measures are employed in

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tiples and underground, more mines are switching over to permissible explosives or blasting devices, more are using permissible electric cap lamps instead of dangerous open-flame cap lights, and electrical installations are safer from a shock and ignition standpoint.

State mine officials in the 24 states covered by the Bureau of Mines inspectors in 1943 were extremely helpful and cooperative in making this safety program more effective. At times, the state inspectors and the federal inspectors worked side by side as a team in fighting mine fires and in participating in mine-rescue and recovery operations. In several instances they went underground together in the routine federal inspections. There were times, too, when state and federal inspectors pooled their knowledge and skill to work out solutions for particularly complex problems encountered by certain operators.

Standards Changed

Toward the close of 1943 the Bureau of Mines made certain changes in the federal inspection standards for bituminous and lignite mines which will be of interest to all mine operators. The standards for safe operating procedures and practices established by the Bureau of Mines to guide its inspectors are subject to alteration from time to time so that they can serve industry and labor more effectively. Due to the war, the Bureau has found it necessary to revise certain of its recommendations because the peacetime safety suggestions cannot always be followed in these days of material and manpower shortages.

For example, the recommendation regarding fire protection for electrical installations formerly read: "Clean, dry sand or rock dust and fire extinguishers, suitable from both a toxic and shock standpoint, should be provided and placed outside of underground electric stations, so located as to be out of the smoke in case of fire in the station." Under the revised standards, the following statements have been substituted for the recommendation: "Fire extinguishers approved for electrical fires should be available at all electric installations. If such extinguishers cannot be obtained, rock dust should be available. Clean, dry sand or rock dust and, if available, fire extinguishers, suitable from both a toxic and shock standpoint, should be provided and placed outside of underground electric stations so as to be out of the smoke in case of fire in the station."

For the guidance of the federal inspectors and for the information of operators, employees and other interested persons the Bureau has placed identifi-

cation marks opposite many of the standards to show that these are of extreme importance in preventing accidents. The revised standards also carry this statement: ". . . a reasonable interpretation should be placed upon them. In numerous cases the words 'reasonable,' 'suitable,' and 'properly' are used in recognition of the fact that reason and sound judgment are vital in carrying out safety endeavor."

There is another point in the new tentative standards which I wish to mention. It is included in the introduction: "In many respects these standards exceed the provisions of the various State mining laws, and some may conflict with the laws or safety orders of some States. In cases of conflict, the



Dr. R. R. Sayers

intent is not to advocate non-compliance with State laws but to suggest reconsideration of such laws or safety orders."

At the end of 1943, the Bureau of Mines had 101 coal mine inspectors on duty, 5 mining-electrical engineers, and 5 mining-explosives engineers. This field staff of 111 Civil Service employees performed many outstanding services to the industry in the 12-month period in addition to their routine inspections of coal mines. To mention a few:

Conducted special surveys to further safety in the handling, storage, transportation, and use of explosives at 37 different operations and inspected explosives-storage facilities at 1,195 different operations.

Made 14 electrical surveys at the request of mine operators who needed assistance in curbing waste of electrical energy and in improving installations to safeguard life and property.

Attended 321 safety meetings after

their day's work and addressed many of them.

Investigated 41 miscellaneous accidents and advised operators how such accidents could be avoided in the future.

Conducted special studies at 243 operations in connection with the War Production Board's scrap-metal drive and advised operators how equipment could be salvaged and rehabilitated, and assisted operators in organizing campaigns to collect materials no longer of use in mines but valuable to the war program as scrap.

Made 177 special investigations and 158 special trips underground and through surface plants at the request of operators. Many of these special investigations were made in response to management's request for assistance in changing ventilating facilities, improving storage facilities for explosives, installing new ventilating fans, adopting special roof-control measures, sealing off fire areas, curbing flood hazards, and making other meritorious changes.

Assisted in 61 mine fires and explosions, organized mine-rescue and recovery work, and prepared special reports in connection with such accidents.

Naturally the many hundreds of mine inspections and the scores of special studies involved the collection of air and dust samples. The Division's laboratory in Pittsburgh, despite its limited staff, analyzed 10,615 air samples and 10,213 mine-dust samples during 1943.

In 1943 there were eight major disasters in the nation's coal mines and they took a toll of 174 lives. Each of these mines was inspected by the Bureau of Mines in 1942 under the Federal Coal Mine Inspection Act and certain safety recommendations were made. I have been asked whether some of these disasters could have been prevented. Yes, if more safety precautions had been taken.

Progress Substantial

The coal-mining industry has made substantial progress in preventing mine accidents, but there is still much to be done in achieving the objective of all safety-minded persons—the elimination of all preventable accidents. Generally speaking, measures that should be taken to prevent these accidents are: a sincere desire by employees and management to prevent accidents, the adoption of a company safety policy, the establishment of a safety organization in which employees and management enjoy equal participation, a program of safety education, adequate and competent supervision, strict discipline, enforcement of state mine laws, adoption of federal mine safety standards,

and investigation and placing of responsibility for all accidents.

I believe that by wider adoption of modern engineering methods and proved safety measures and by more

intensive safety education better accident records can be achieved. The nature of mining operations and human beings is such that there always will be accidents. But they can be curbed and

kept at a minimum. The attainment of this goal requires the continued co-operation of management, labor, and State and Federal governments, and constant vigilance by all concerned.

COAL-MINE SAFETY

By WILLIAM W. ADAMS

Supervising Statistician
U. S. Bureau of Mines
Washington, D. C.*

WITH PRODUCTION of coal reaching an all-time high in 1943, the coal-mining industry of the United States established a safety record that was as favorable as, and probably more favorable than, the record of 1942, according to information now available.

Incomplete reports lead to an estimate of 1,476 as the number of coal-mine workers who were killed by accidents at coal mines during the year just closed. Production is estimated at 649 million tons, an increase of 11 million tons over the output of the previous year. Fatal accidents during the year occurred at the rate of 2.27 per million tons, which compares favorably with a rate of 2.30 fatalities per million tons of coal mined during 1942, a year when fatal accidents totaled 1,471 and when the output of coal slightly exceeded 638 million tons.

The estimated number of fatal accidents during 1943 is based upon actual reports from State mining departments for the eleven months, January to November (with an allowance for usual revisions because of deaths from lingering cases of serious injury), with an estimate to cover fatalities during December.

The low and relatively favorable level at which the fatality rate was held in 1943, in spite of the high production of coal in a year wherein wartime conditions prevailed, is a record in which mine managers and their employees may well take pride.

According to data now available, bituminous-coal production in 1943 amounted to 589 million tons—roughly 11 million tons more than the quantity produced during 1942. Accidents at the mines caused 1,248 fatalities among the employees. Anthracite mines in Pennsylvania produced about 60 million tons of coal during the year and accidents to the

employees caused 228 deaths, according to preliminary data. The fatality rate for anthracite mines was 3.80, indicating an improvement over the record of the preceding year.

Falls of Roof and Coal

Of the estimated 1,476 fatalities from all causes of accidents at coal mines during the past year, 753 were



W. W. Adams

attributed to falls of roof and coal; thus more than half of the fatalities were due to the same mining hazard that has virtually always been the chief risk to which miners are exposed. The death rate for this class of accidents during 1943 was 1.16 per million tons of coal produced, compared with 1.13 for the preceding year. Five years ago (in 1938) the rate was 1.52 and ten years ago (in 1933) it was 1.51. Compared with these earlier years, the rate for 1943 showed a decided improvement.

Haulage

Haulage accidents underground killed 277 men in 1943, about 19 percent of the total number of men killed by accidents in and about coal mines during the year. In addition, some fatalities among surface employees doubtless were attributable to ac-

cidents in which haulage equipment was involved, but no estimate has yet been made of this number. The usual types of fatalities from haulage accidents to underground workers are those in which men are killed by being struck or run over by cars, or squeezed between cars or haulage motors, and those accidents in which employees are squeezed between cars and the rib, timber or roof. The death rate from underground haulage in 1943 was 0.43, according to present information, compared with 0.44 for 1942. Comparable rates were 0.42 for five years ago and 0.51 for ten years ago. With production of coal per man-hour increasing rapidly in recent years, transportation of the coal underground occasions more difficult safety problems than in earlier years, and these problems demand an increasing measure of attention if higher death rates from haulage accidents are to be prevented.

Explosions

Eight major disasters (so called because each resulted in the loss of five or more lives) occurred in 1943. Disasters of such magnitude are usually explosions, but of those in 1943 one was a mine fire that caused 13 deaths, and 7 were explosions in which 161 lives were lost. Comparable records for 1942 revealed 6 major explosions with 127 lives lost. One of the explosions in 1943 occurred in an anthracite mine in Pennsylvania and caused the death of 14 men. As a result of the major explosions in 1943 the death rate was 0.248 per million tons of coal produced during the year, compared with a rate of 0.199 for 1942. Explosions classed as minor or local produced a fatality rate of 0.042 per million tons in 1943 and 0.045 in the preceding year. A list of the major explosions in 1943 is given in the accompanying table.

Explosives

The coal-mining industry is the largest consumer of industrial explosives in the United States. It is to be expected, therefore, that blasting will

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appear among the causes of accidents to the employees. Estimates of the quantity of explosives used in 1943 show approximately 169 million pounds—about 1 lb. of explosives for every 4 tons of coal produced from underground and open-pit mines. Tentative figures show that of the total quantity of explosives used in coal mines during 1943, about 48 percent was of types classed as "permissible"; that is, explosives that, having passed certain tests to meet the safety standards of the Bureau of Mines, are considered less dangerous for coal-mining work than either other classes of high explosives or black blasting powder. Accidents from explosives caused 38 deaths in 1943, and this figure represents a frequency of 0.059 fatality for each million tons of coal produced. The previous year's rate was 0.047. Five years ago the fatality rate per million tons for accidents caused by explosives was 0.086; ten years ago the rate was 0.089. Some of the improvement shown by the declining death rates may be credited to the replacement of more dangerous types of explosives by explosives of "permissible" brands.

Electricity

With the increasing use of electricity in mining operations for haulage locomotives, for operating mining machines, and, more recently, in the expanding use of mechanical coal loaders and conveyors, accidents from electric shock and burns continue to rank among the chief causes of deaths to the employees of the mines. Thirty-four deaths were caused by electricity during 1943, according to preliminary reports to the Bureau of Mines. This number of fatalities represents a fatality rate of 0.052 per million tons, as compared with a similar rate of 0.089 for the preceding year. In 1938 the rate was 0.101; and in 1933, 0.138. These figures constitute strong evidence of good housekeeping in the mines, at least as far as occupational hazards from electricity are concerned.

Machinery

Twenty-seven employees working underground in coal mines were killed by accidents caused by machinery of all kinds. This does not include accidents chargeable more directly to haulage motors, if haulage motors may be classed as machinery. Considering the increasing mechanization of extraction and loading work in the mines, machinery accidents did not cause an unexpectedly large proportion of the total number of fatal accidents either in 1943 or in the previous year, as the proportion chargeable

Coal-Mine Fatalities in the U. S. During 1943*

Cause	Bituminous		Pa. anthracite		Total	
	Number of Fatalities	Rate per Million Tons Mined	Number of Fatalities	Rate per Million Tons Mined	Number of Fatalities	Rate per Million Tons Mined
Underground:						
Falls of roof and coal.....	634	1.076	119	1.983	753	1.160
Haulage.....	239	.406	38	.633	277	.427
Explosions: Major Local.....	147	.250	14	.233	161	.248
Explosives.....	26	.044	1	.017	27	.043
Electricity.....	33	.056	1	.017	34	.053
Machinery.....	26	.044	1	.017	27	.043
Miscellaneous.....	26	.044	13	.217	39	.060
Total underground.....	1,160	1.969	196	3.266	1,356	2.069
Shaft.....	8	.014	1	.017	9	.014
Open-pit.....	23	.039	10	.167	33	.051
Surface.....	57	.097	21	.350	78	.120
Grand total, 1943.....	1,248	2.119	228	3.800	1,476	2.274
Grand total, previous year.....	1,245	2.147	226	3.875	1,471	2.305
Production, tons (est.).....	589,000,000		60,000,000		649,000,000	
Production, previous year, tons.....	579,874,000		58,316,022		638,190,000	

*Estimate from tentative reports for January to November.

Major 1943 Mine Explosions

Date	Name of Mine	Location	Number Killed
Feb. 27.....	Smith.....	Red Lodge, Mont.....	74
May 5.....	NuRex.....	Lafollette, Tenn.....	10
May 11.....	Praco No. 10.....	Jefferson, Ala.....	12
Aug. 28-29.....	Sayreton No. 2.....	Sayreton, Ala.....	28
Sept. 16.....	Three Point.....	Harlan, Ky.....	12
Sept. 24.....	Primrose.....	Minersville, Pa.....	14
Nov. 6.....	Nellis No. 3.....	Nellis, W. Va.....	11

to machinery was only about 2 percent of the total. The fatality rate for accidents of this class was 0.042 per million tons of coal, which compares favorably with the previous year's rate of 0.078. The corresponding rate five years ago was 0.068, while that of ten years ago was 0.065.

Miscellaneous Causes

About 90 percent of all fatal accidents in coal mines during 1943 are covered by the classes of accidents already discussed: falls of roof and coal, haulage, explosions, explosives, electricity, and machinery. The remaining 10 percent were attributable to a variety of hazards in both underground and open-pit mining, to hazards in shafts, and to those incident to surface labor at underground mines. Open-pit mining was responsible for about 2 percent of the fatalities, and surface work at underground mines was charged with about 5 percent. The combined fatality rate from all such "miscellaneous" causes of accidents during 1943 was 0.245 per million tons of coal mined during the year—better than during 1942—0.273. The corresponding rate for 1938 was

0.337, and that for 1933 was 0.369. The record for 1943 therefore was more favorable than that of the previous year and also compared favorably with the records of typical earlier years.

Non-Fatal Injuries

No specific data are available on the number of non-fatal injuries to coal-mine workers in the United States during 1943. The number of such injuries, however, may be estimated with a fair degree of approximation from the known usual ratio between the number of fatalities and the number of injuries. Pending complete reports from operating companies, this method leads to an estimate of 51,200 injuries at bituminous mines in the various coal-producing States and about 15,500 injuries at the Pennsylvania anthracite mines. The rate of occurrence of non-fatal injuries thus stands at 87.00 per million tons of bituminous coal produced during 1943 and 256.83 per million tons produced at anthracite mines in Pennsylvania. Each of these figures is slightly more favorable than the corresponding rate for 1942.

RESEARCH AND COAL UTILIZATION

ALTHOUGH production for war held the center of the stage, coal research nevertheless reached a new high in interest in 1943. Expanded programs were announced by both the anthracite and bituminous industries leading to more efficient utilization as well as to new uses for coal. Anthracite operations, in particular, were directed toward getting the most out of a ton of coal and thus helping the war effort.

The Anthracite Industries laboratory cooperated with the Army and Navy and other government agencies in teaching firing methods, testing and rating heating equipment and advising on design and conservation of metals. The general public was the objective in a campaign on insulating and otherwise cutting down heat losses, on proper firing methods and on spreading supplies over the heating season on the basis of temperature control. Going even farther, the industry embarked on a campaign of developing efficient anthracite-bituminous mixtures and best methods of using them. At the same time, it continued and expanded its research work directed toward better equipment, methods and new uses.

An example of progress in a new field, anthrafilt, a fine size of anthracite used for filtration of water and liquids to remove turbidity, odors and color, has recently been employed on top of a filter bed of sand. This practice, originated in Raton, N. M., is used at Chester and Erie, Pa., and at Buffalo, N. Y. Most of the turbidity is removed by the anthrafilt and the fine sand catches the almost colloidal material that might otherwise escape. It is found that using anthracite in place of sand has raised the capacity of filter plants (from 16,000,000 to 30,000,000 gal. daily at Oklahoma City, Okla., as an example) and lengthened the runs in periods of algae infestation and wherever, as with swimming pools, the turbid matter is chiefly lint and hair.

New Program Ready

Readiness to commence its new five-year \$2,500,000 research program with twelve major investigations involving over 90 specific topics was announced by the board of directors of Bituminous Coal Research, Inc., Sept. 18. Early in 1944 it was disclosed that the 150,000,000 tons of participation set as the minimum was in sight and that

the expanded program therefore would be initiated. Full financing of the program necessarily will require larger participation, which is expected to be forthcoming.

Included in the BCR program are complete combustion of coal in equipment ranging from cabin heaters to large industrial furnaces, cooling of residences in summer using the same furnace that heats the house in winter, conversion of coal into gas without by-products, "cradle-to-grave" household stokers which take their coal from a bin and put the ashes into containers or ash pits, coal-fired locomotives able to operate for hundreds of miles without stops for fuel or water because of more complete and smokeless combustion, heaters and ranges that "don't smoke or go out nights" and need but one kindling a season, better chimneys, "fluid coal" that burns in a hot furnace like gas to replace oil and gas where steel is now being heated for rolling and forging, internal-combustion engines using pulverized coal, gas turbines, coal as an ingredient in brick manufacture, synthetic rubber from coal and an ash-free combustible liquid to be attained probably by hydrogenation.

Chemicals From Coal

Coal men also eyed chemicals and other byproducts, but since chemical drugs like aspirin and coloring mediums like aniline do not offer possibilities of sizable markets they were inclined to be skeptical about the quantity of coal that may be earmarked for strictly chemical uses. Yet, early in 1943, du Pont estimated that chemicals would utilize the byproducts resulting from the conversion of more than 100,000,000 tons of coal.

Chemists regard it as certain that in the era in the offing plastics will be filling many of man's material wants, and that the Stone, Bronze and Iron ages are about to be superseded by the age of Plastics. In this development, coal will play an important—if not exclusive—role. Clothing, furniture, "glass," gadgets, decorative materials, synthetic tires, "rubber" bags, etc., all are derivable from plastic sources. The war has stimulated such developments, although few details are being released—for security reasons.

The oil situation was regarded as

holding out considerable promise of business for coal in the future. Supplementing research work already carried on for some years by the Bureau of Mines, the O'Mahoney bill for the erection of commercial-scale facilities for liquid fuels from coal was introduced in Congress in 1943 and passed the Senate on Nov. 9. The bill provides for the expenditure of \$30,000,000 in coal hydrogenation work and investigation of oil shales and other possible sources of liquid fuel.

Oil From Coal

Some held the belief that the Fischer-Tropsch or some similar process employing synthesis to restore what is broken down by the water-gas reaction is a solution that might have a more profitable result, but, in view of the threatened oil shortage, some prompt action seemed necessary. The oil-shale approach also has its advocates. But what the public wants just now is gasoline, and gasoline from hydrogenation has a higher anti-knock value than Fischer-Tropsch gasoline and can be readily doped by lead compounds to make it even better in action. But, in some ways, slowness also has its merits. Diesel oil should not be too easily exploded and that made by the Fischer-Tropsch process is in large part so good in this direction that it is used to slow faster oil. However, some of the diesel oil made by the hydrogenation process is of suitable quality.

A means of stretching oil by the addition of fine coal ending in a product known as "colloidal fuel" has been studied by the Bureau of Mines and found to promise good results. The petroleum situation made itself felt in another way—in the dustproofing of coal. The ban on the use of petroleum products, which was little relieved by permission to use fuel oil and other refining residues granted at the end of the year, resulted in a study of calcium chloride and other materials as substitutes. Within limits and depending upon the coal, calcium chloride was found a good dustproofing medium (September, 1943, *Coal Age*, p. 57).

Independent research organizations also continued their work on coal in 1943. Battelle Memorial Institute, as an example, determined the best ways of providing the over-fire air used to assist the combustion of furnace gases

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above fuel beds. The University of Minnesota some time back organized the Northwest Research Foundation, which participated in developing a procedure for obtaining hydrogen for lignite for the purpose of converting taconite (a highly siliceous iron) to sponge iron. As the iron is extremely impure, it is necessary that the fuel be unusually pure, and hydrogen, which burns without residue, has that quality. The Bureau of Mines is making tests

at Golden, Colo., in a plant designed to convert 100 lb. of lignite into hydrogen hourly, and a plant to cost \$15,000 and process 600 lb. hourly is to be erected at Grand Forks, N. D., early in 1944.

MANPOWER: LEADING COAL PROBLEM

NO. 1 PROBLEM in coal's No. 1 job—winning the war—is manpower. Solution of that problem was put first by a wide majority of presidents of coal-mining companies replying to a *Coal Age* telegraphic inquiry on major questions confronting the industry today. Disturbances growing out of price developments and the growing tendency of government to regulate the industry more and more were other problems cited by many coal heads as reason for concern not only now but for their effect on the future of coal mining—a future that many hold should be prepared for beginning now along with the No. 1 job of producing for war purposes. How coal-mine presidents look at these and other problems is set forth in the individual statements which follow.

The coal industry, in my judgment, needs above all else unity of purpose and of action. If the experience, energy and talents existing in the ranks of the men who run the coal industry could be effectively united and focused on the solution of its major problems, I believe many of these problems would cease to exist.

The mines are highly mechanized; large sums of money have been invested in preparation plants; mine management is skilled and progressive; sales organizations with their combustion engineers are rendering effective service to the consumers of coal; the men who work in the mines are a typical cross-section of the better element of American labor.

With these tools and in spite of unforeseen handicaps and interruptions of operations which materially reduced the tonnage for 1943, the industry produced 589,000,000 tons of coal, only 11,000,000 tons less than the 600,000,000-ton goal set by the government at the beginning of the year. This is a record of wartime service with warrants justifiable pride. Many of these handicaps were beyond the power of the industry to control. It was buffeted by forces



from without which it was unable to combat.

I cannot but wonder whether, if a higher degree of industrial statesmanship had been developed by coal operators, some of these forces might not have been overcome before they overcame us. Such statesmanship and such leadership can come only from unity of purpose and of action. I do not know if we can attain it but I believe it is worth a very great effort.

As to the immediate problems, the manpower situation at the mines is one of the most serious. This should have prompt consideration by the proper government agencies and effective and vigorous action should be taken. The industry cannot produce the coal necessary to back the war effort if it continues to lose workers from its mines by the thousands.—**FRED S. McCONNELL**, Enos Coal Mining Co., Cleveland, Ohio.

Anthracite's biggest present problem is to do what it can to help win the war. In spite of some loose talk to the contrary, the contribution of the industry to the common cause has been very good. It can be better in the coming year. Adequate wages,

adequate prices and hard work by everyone is what is required. Wages are now at a wartime peak and prices, while still inadequate to meet increased costs, have been advanced to some extent. The third factor—namely, hard work—can be supplied only by each individual connected with the production and distribution of anthracite. None can give less than his best and feel that he has done his duty.—**J. B. WARRINER**, Lehigh Navigation Coal Co., Inc., Pa.

Coal needs at the present time the best cooperative effort possible to solve the pressing distribution problem. All selfish motives should be discarded and the best minds combine to solve the immediate danger. The good will of the public for a long time to come can be won or lost by the manner in which this pressing danger is met.—**JAMES PRENDERGAST**, Susquehanna Collieries Co., Cleveland, Ohio.

Maintenance of production to meet the increased needs of the nation during 1944 is the big problem facing the bituminous coal industry. The fundamental prerequisites to an adequate production are: (1) a stabilized wage structure; (2) adequate manpower; the shortage of manpower in skilled mechanics in particular demands immediate comprehensive and cooperative action by the government; to temporize now means serious trouble later; (3) supplies and equipment; while the desired new equipment was not always available, the thanks of the industry are due to those who so wisely and efficiently directed the activities of the Mining Division of the WPB, since they did make available an adequate supply of



materials and repair replacements.—
W. J. JENKINS, Consolidated Coal
Co., St. Louis, Mo.

In my opinion the problem is easy to define, namely: production; but the solution is difficult, due to the shortage of manpower in the industry, which should have been prevented; strikes, which should have been prevented, and to absenteeism, which is now at a peak at many mines and which should also be prevented for the duration of the emergency.—A. R. LONG, Brookside-Pratt Mining Co., Birmingham, Ala.

One of the biggest problems we face is that of aiding the Solid Fuels Administration in obtaining equitable distribution and relieving actual distress conditions so as to avoid evils of all-inclusive rationing with the destruction of valuable customer relations it would involve. This requires our furnishing experienced assistance in determining the relative urgency of

many pleas for assistance and prompt and intelligent compliance with directives issued by the Solid Fuels Administration—R. D. STOCKDALE, Red Jacket Coal Sales Co. and Upper Buchanan Smokeless Coals, Inc., Columbus, Ohio.

Additional sales price allowance inadequate to meet actual excess costs under contract imposed upon us. Sunday or double-time employment prohibitive. Therefore, present operating conditions conducive to inefficient operation.—G. J. JEFFRIES, Jeffries Coal Co., Roundup, Mont.



Biggest problem is to win the war; it is to cooperate, leaving personal difficulties until later.—JOHN C. HADDOCK, Haddock Mining Co., Wilkes-Barre, Pa.

the lack of control of labor, production is lower and quality of product is inferior, which will hurt coal later.—ANDREW B. CRICHTON, Johnstown Coal & Coke Co., Johnstown, Pa.



Coal's biggest present problem is the Ickes-Lewis wage contract. Its method of computation produces confusion, misunderstandings and strife; portal-to-portal pay leads to

ridiculous conclusions.—J. E. BUTLER, Stearns Coal & Lumber Co., Stearns, Ky.

The two most critical problems in the coal industry are the drain on manpower by the draft and the failure of OPA to give adequate price relief.

The drain on manpower is very complicated in this part of the country for the reason that the draft boards' policies in various places are very irregular and in spite of all the requests for exemption and applications you can make they keep on taking some of the best men. One draft board recently advised that they were scraping the bottom of the barrel for men and that as they had a quota to make they would take men where they found them. Some national instructions to the draft boards would be very helpful.

Another problem in connection with this is that the men are getting very jealous and a number of wildcat strikes have occurred in this part of the country because certain men were exempted and other men were taken. The men themselves are demanding that there be no exemptions and that everybody should take their turn like their boys did.

The next important problem is OPA prices. The costs are continually rising and no adequate recognition has been given. Many mines will have to suspend operations unless there is a general relief.—C. V. BECK, Florida Coal Co., St. Louis, Mo.

to remedy this situation. Present production and industry's requirements for the coming year most serious.—S. B. JOHNSON, Lorain Coal & Dock Co., Columbus, Ohio.

Coal's biggest present trouble is that of manpower, and I believe that if the wage agreement were definitely settled and labor peace in the industry assured, it would go a long way toward inducing men who have left the mines to return to their former jobs. Furthermore, there should be further limitation on taking of men in the draft for the armed services.—L. G. BALL, Heisley Coal Co., Philadelphia, Pa.

Absenteeism and loss of men to military service [constitute coal's biggest problem]. The United Mine Workers of America should correct the former by insisting on their men working full time; (2) selective service should recognize that coal is the first line of defense and should defer miners who are working full time.—O. L. ALEXANDER, Pocahontas Fuel Co., Inc., New York City.

In our opinion the coal industry's biggest present problem is manpower. With the advent of mechanization younger men have been more in demand. The War Manpower Commission should take immediate steps

My biggest problem is to keep the local draft boards from taking our better class of men.—W. S. LECKIE, Leckie Collieries Co., Columbus, Ohio.

Coal's biggest problem is lack of labor to produce, due to the draft and, particularly, absenteeism on the part of those on the payrolls. With

In my opinion coal's biggest present problem is completion of an equitable contract between miners and operators in all operating districts, with better machinery provided to settle mine disputes than now exists. This problem could be met if a more cooperative attitude was shown by the mine workers. In my opinion much trouble is fostered by unreasonable demands of district leaders which Lewis cannot or will not modify. Factionalism among operators and dilatory procedure of WLB adds to



men working full time; (2) selective service should recognize that coal is the first line of defense and should defer miners who are working full time.—O. L. ALEXANDER, Pocahontas Fuel Co., Inc., New York City.

In our opinion the coal industry's biggest present problem is manpower. With the advent of mechanization younger men have been more in demand. The War Manpower Commission should take immediate steps

the confusion. Don't know how to make people more broad minded and less uncompromising. It is an age-old problem.—R. H. SHERWOOD, Central Indiana Coal Co., Indianapolis, Ind.



To intelligently assay the bituminous coal situation, determine its present major problems and to suggest remedial measures is a difficult task. First let it be said that a coal famine has so far this winter been averted by the extension of the work week from five to six days, a shift too long delayed, plus an extremely favorable winter. What is most needed is a wage contract that is understandable to the workers—one founded on equity rather than subterfuge and based on a definite work day, eliminating the specious travel time involvement that cannot be made to work smoothly. There also is a sharp necessity for an increased sense of responsibility to the war task on the part of all, particularly in the form of reduced voluntary absenteeism, less slow-down and the total elimination of strikes. The coal taken out of stor-

age this winter must be restored.—EUGENE McAULIFFE, Union Pacific Coal Co., Omaha, Neb.

Scarcity of mine labor continues to be coal's biggest problem in the West. The government's labor policy has unbelievably hampered both production and distribution. Many smaller properties have been closed by reason of inadequate ceilings to compensate for drastic wage increase. These properties are gradually being reopened but loss of production has occurred in the meantime. Markets are not now a problem, but may easily become so a few months hence by reason of new properties coming into production and the possible—if not probable—lightening of government and defense-plant demands.—JAMES S. RAMAGE, Continental Coal Co., Spokane, Wash.

I should say that absenteeism and the unwillingness of the men in the mines to work a full shift is the problem—how to solve it is an even greater one, but it has been my personal opinion that it could be solved with the aid of those government agencies which have been stimulating production in other industries.—ALAN C. DODSON, Weston Dodson & Co., Inc., Bethlehem, Pa.

would force labor to assume equal responsibility with management.—KENNETH A. SPENCER, Pittsburg & Midway Coal Mining Co., Kansas City, Mo.

Coal's greatest present problem in Oklahoma and Arkansas is that production from underground mines is reduced to one-half normal tonnage, on account of labor shortage. This reduction in tonnage in connection with the increased wage scale recently effective has increased costs to figures that are in many cases above present ceiling prices. Draft boards should discontinue inducting coal miners and as many as possible of the miners that have been inducted into the army should be released. The present shortage of coal and labor is encouraging the opening of many small strip mines, most of which are without facilities for preparing their product and will therefore ship inferior and unsatisfactory coal. After the duration the coal industry will need more than ever before the stabilization given it by the Bituminous Coal Act of 1937, which expired last August.—J. G. PUTERBAUGH, McAlester Fuel Co., McAlester, Okla.



As I see it, the coal industry—meaning all workers, producers and dealers—have three great tasks to perform in 1944: (1) We must produce and distribute enough coal to swamp the

Axis without depriving our civilians; (2) we must make adjustments to preserve our markets and maintain our production after the war, and (3) we must plan now to provide a maximum of good postwar jobs. To accomplish the first task we must boost production by further reducing absenteeism, by increasing mechanization where possible, by convincing the authorities that we need more manpower, and by all working just a little harder. To preserve our markets and maintain our production after the war, we must make all possible adjustments now to keep costs down, and efficiency and quality up. If we don't plan now to provide a maximum of good postwar jobs, we may win this war and lose the peace. The reemployment of our fighting men is industry's prime postwar responsibility. And the only way to meet it is for each company and each industry to plan now to take care of its own, and then to work faithfully to that end.—MORONI HEINER, Utah Fuel Co., Salt Lake City, Utah.

Future Also a Factor



I consider coal's biggest present problem is to relieve itself of the many government regulatory shackles and to make every effort to get back into free American enterprise.—D. H. PAPE, Sheridan-Wyoming Coal Co., Sheridan Wyo.

Shortage of miners and too much government regulation our problems.—Gallup Southwestern Coal Co., Gallup, N. M.

Dissatisfaction among coal loaders, piece workers who don't comprehend the new contract wage formula and the fact that the miners have no contract with the operators creates uncertainty and inertial feeling with a tendency to wait out further notifications. This is further augmented by continued draft of pivot and skilled men, which, together with complicated and various reports and delays in obtaining necessary supplies and equipment,

sums up to too much interference and regulation and makes for anything but a healthy, vigorous industry and which if continued into the postwar period will strangle and eliminate 50 percent of coal production as a competitive fuel.—GEORGE B. DICK, Dick Coal Co., Walsenburg, Colo.

First, we should give the public the best service possible—both our industrial customer and the householder—because there will be a hereafter; second, it is imperative that we tell the public more about our industry.—GRANT STAUFFER, Sinclair Coal Co., Kansas City, Mo.



Greatest need of the coal industry, in my judgment, at the present time is to be relieved of restraining regulations and government red tape, a revision of tax laws to permit return of venture capital in new productive facilities and national legislation that

HIGH-WALL PREPARATION

Big Factor in Successful Strip Mining

Loose, Easy Overburden Increases Output and Reduces Maintenance in Stripping — Modern Drills and Explosives, Plus Study of the Conditions, Assure Results — Shooting Methods That Have Worked

By FRED W. RICHART
Assistant Editor, Coal Age

THE SECRET of cheap stripping is a mellow high wall and solid, level coal. Nature has done a good job of making the overburden easy to dig in a few locations but often has left the surface of the coal rough and uneven. It is the tough overburden at many strip mines that challenges the brain of the explosives engineer and worries the owner of the shovel.

The preparation of a laminated limestone high wall for stripping is the most important job around a strip mine of that type. Likewise, it often is the most expensive single operation at such a mine.

The importance of good high-wall preparation lies in the need to prevent damage to the quarter- and half-million-dollar shovels that strip mines must buy. These machines will handle

loose material without damage and with relatively little wear. They will not dig solid limestone or handle boulders as large as a house; and they should not be required to dig tight shots or hard shale. Explosives are made to reduce handicaps. The alternative is high shovel maintenance, lost time and curtailed output.

The expense of drilling and shooting lies in the number of drill rigs required, the cost of explosives (often the largest single supply item), drill-crew wages and maintenance. One strip mine with a single 30-yd. stripper has eight drills in service. Another, with less serious high-wall conditions, requires five similar drills to keep ahead of a 26-yd. shovel. While any comparison may not be strictly fair unless exact conditions can be made known, it can serve to indicate what a big job the preparation of a high wall for stripping sometimes may be.

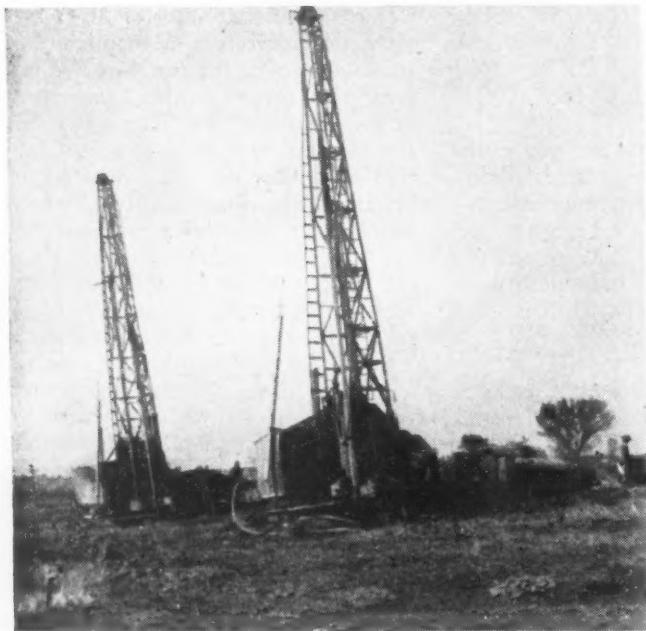
To explain a little more graphically, in the first-mentioned case holes are

staggered 24 ft. apart. Much of the overburden is around 55 ft. deep and the coal is about 6 ft. thick. This requires 80 holes per acre and a total drilling footage of nearly 4,500. With a large percentage of limestone in this overburden, the difficulties of drilling and shooting may be appreciated.

Preparation an Art

Like every other problem where conditions are never duplicated, no hard and fast rules can be laid down. The drill boss must make his decisions out of his own experience and that of his neighbors. As with the medical profession, there are general principles that point the way, but a diagnosis of the case must determine the kind and size of the dose. As pointed out by a man with many years of experience: "The preparation of a high wall for stripping is not a science, it is an art"; science is recorded in books, art is the result of imagination and experience.

The blasting artist takes a look at



Crawler-mounted rotary rigs at work in Illinois. They cost more but drill faster.



This auger drill for shale and clay was designed and built in a mine shop.

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the cross-section of the high wall, the wheels of his brain buzz a few turns and he has an answer. The test may fall short. So he changes hole spacing, type of explosive or size of the shot and tries again. He soon gets a line on the direction to go and adopts a code to fit his conditions.

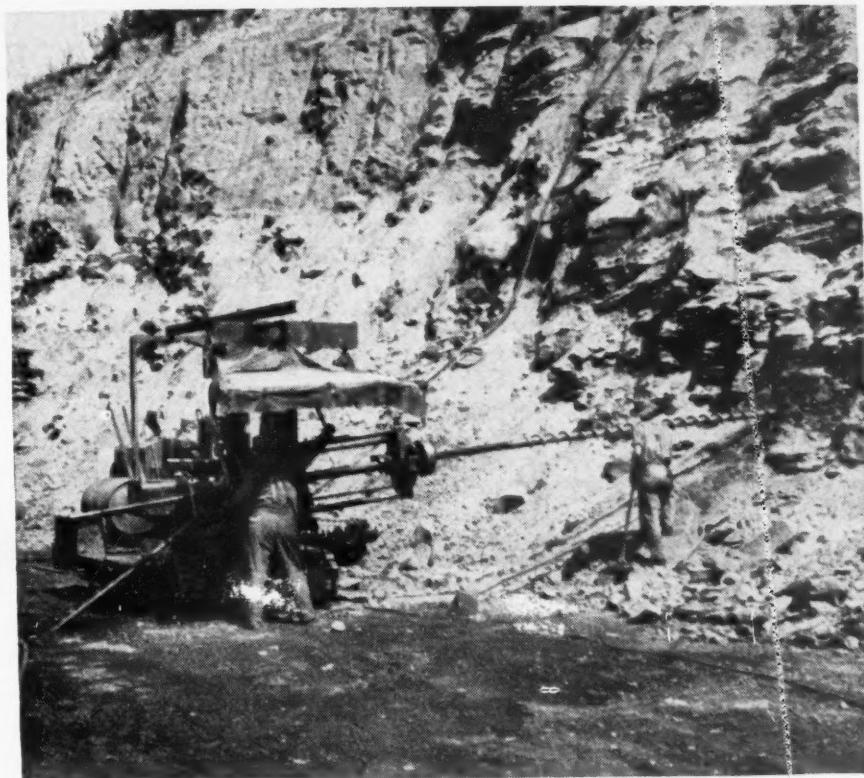
Fulton County, Illinois, is an area that requires little blasting. Pittsburg, Kansas, has cap rock with some sand and, in some areas, much hard shale. In both these fields, where blasting is necessary, the drilling usually is done with the horizontal auger drills and the blasting with some type of dynamite. Southern Indiana and southern Illinois frequently have tough limestone or sandstone overburdens requiring vertical drills and the best of the blasting engineer's art. In these fields the overburden varies from a few feet of soil and clay to material that is more than half limestone with sandstone and hard shale thrown in for good measure in a total depth as great as the cost sheet will permit. High explosives and liquid oxygen are both used for blasting in these two States, along with other mediums. Other stripping fields differ from these in many respects and require methods that fit the materials and their geological makeup.

Ratios Run to 32:1

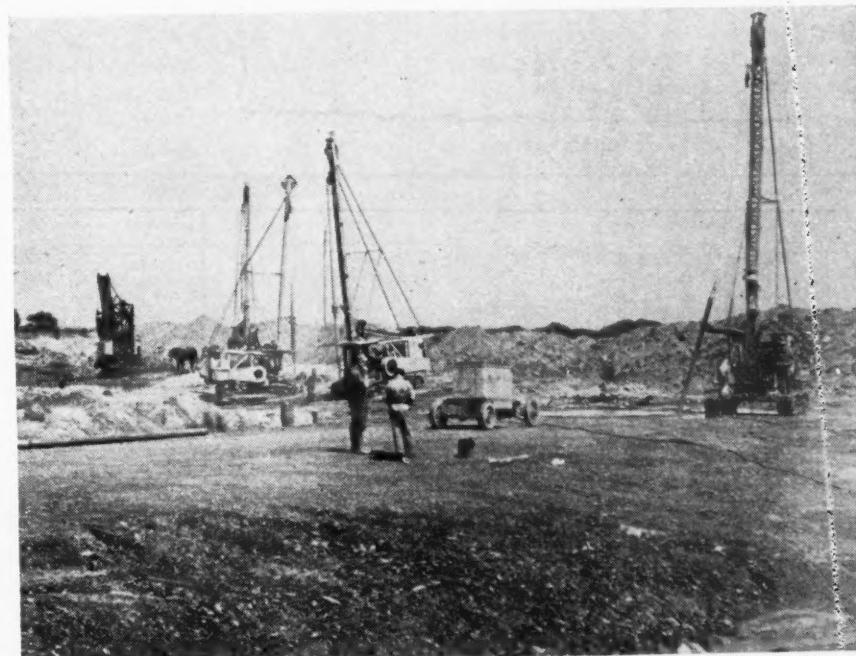
The ratio of overburden to coal that may be stripped is dependent on the character of the overburden, thickness, price of coal and access to the market. The Kansas field has ratios running as high as 32 to 1. Most other areas do not care to go beyond 12 or 15 to 1. There also is a limit to the reach of large shovels that stops their use, without the help of a dragline or other auxiliary, at about 60 or 65 ft. of cover. With a dragline as an accessory, the cost sheet is the limit.

Most of the difficult high-wall drilling is done with vertical rigs of the churn type. Modern drills of this type are well made and have long life. Other types of drills are also used. One mine in southern Illinois has five rotary drills in two pits followed by 18- and 30-yd. strippers. These drills are more speedy than churn drills in hard material. The relative footage in a similar overburden is around 75 percent more than for a modern churn drill. The rotary bits are similar to those used in oil-well drills but smaller in size. Four motors totalling 60 hp. drive this rotary drill, while the churn drill is driven by one 15- or 20-hp. motor. Cost of the rotary drill is approximately three times the cost of the churn drill.

Vertical auger drills are used where



Crawler-mounted horizontal auger drill putting in a hole for a high-wall shot.



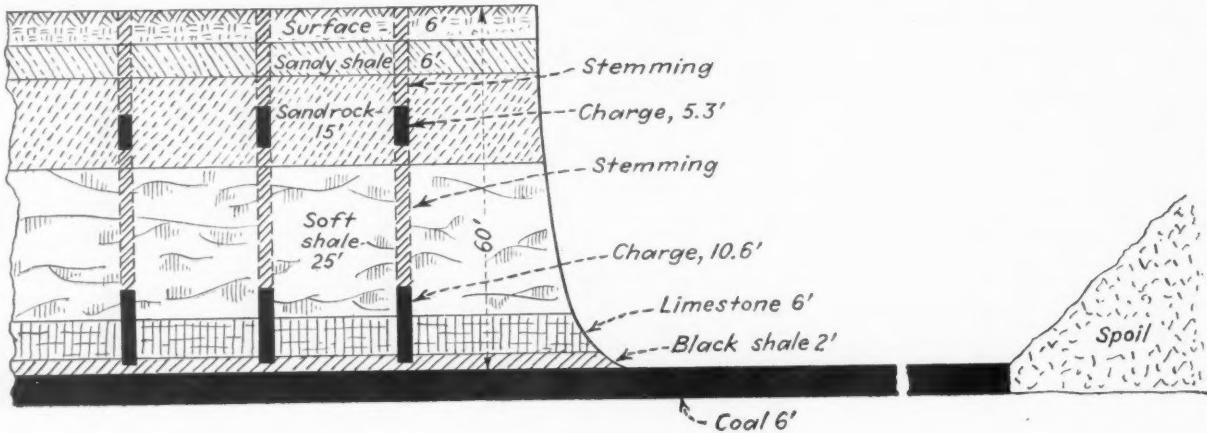
A group of four churn-type drills working on a high wall in tough overburden. A drill boss is in charge of this group and a duplicate just down the line.

the "mole's foot" head will cut the material economically. Where they can be used, they have three decided advantages over the churn and rotary types in that they require no water, are self-cleaning and are faster.

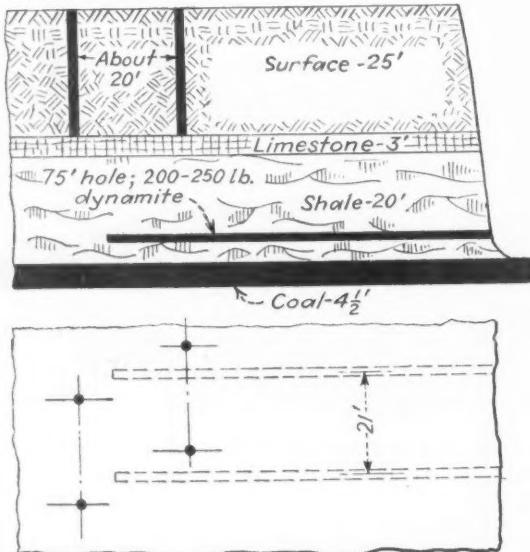
One company with a tough 20- to 35-ft. sandstone stratum to drill built a modified auger drill to overcome the difficulties with the usual type. This

machine is driven by a 30-hp. two-speed reversible motor, controlled from a panel with five pushbuttons. The drill speeds are 320 r.p.m. for soft material, 160 r.p.m. in sandstone and back to 320 r.p.m. for cleaning out the cuttings. The mole's-foot cutter head carries eight $\frac{1}{2}$ -in.-square tool steel bits forged with long beveled cutting ends. To give these bits a reason-

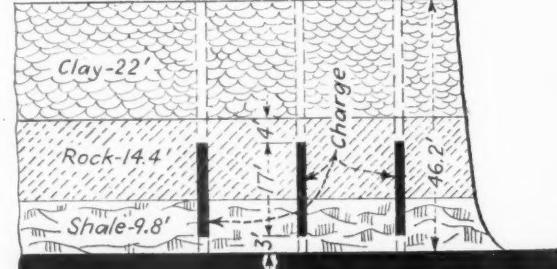
HOW SOME STRIP OPERATORS HAVE TACKLED



Blasting the high wall at this pit is a tough job. The drilling of all high-wall holes is in echelon, as in the pattern at the left.

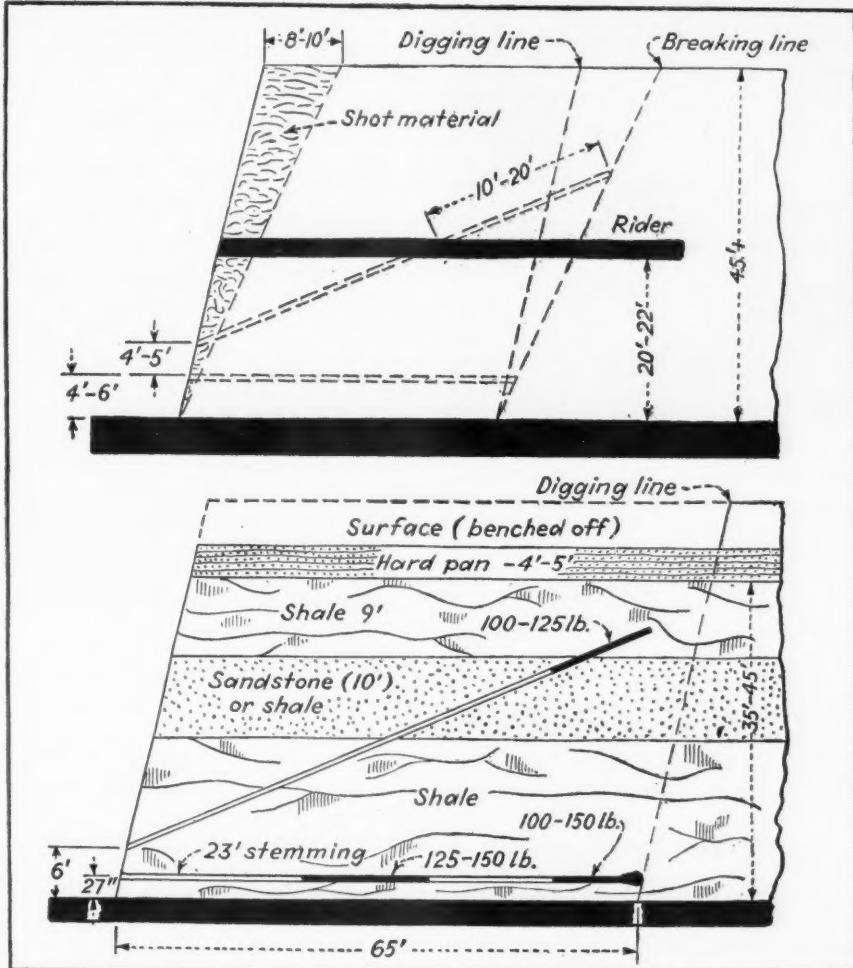


This rather unusual job of high-wall shooting features vertical holes down to the limestone to break it up so the horizontal shots can heave the overburden the full depth of the horizontal holes. Where convenient, vertical holes are between horizontal holes. All shots in or near a vertical plane through the horizontal hole are fired together. The farthest-in vertical hole is just beyond the bottom of the horizontal hole.

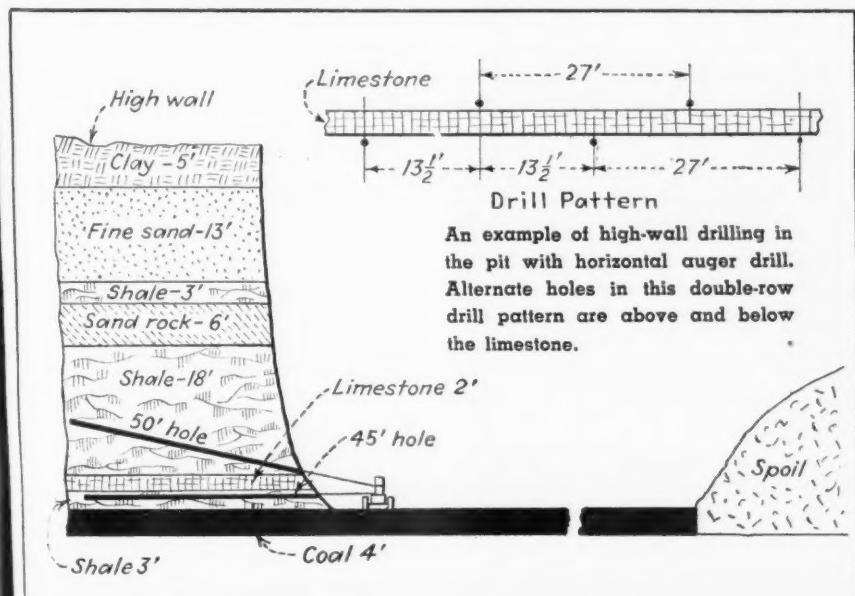


Drilling and loading at a mine with plenty of hard rock to contend with. The pattern at the bottom indicates the drilling locations.

UNUSUAL SHOOTING PROBLEMS



Example of double-deck shooting plans employed to break up banks with hard or tough materials in the top. In the plan at the bottom, use of two holes reduced screenings output 10 points, cut the quantity of explosive necessary and enabled the dragline to work to the full depth of the holes, thus gaining 5 ft. on each cut. In the system shown at the top, the explosive charge in the upper hole is brought farther toward the front of the bank and to provide sufficient resistance a layer of shot material is left in place.



able life, the back side of each is coated with Stoodite and the front with borium. The rear side is built up to a nice clearance so that the finished bit resembles a lathe tool. Although drilling this sand is very slow compared to drilling shale, the drill gets the job done.

Another type of auger drill much in favor for shale, or where there is a thin cap rock near the coal, is the horizontal pit drill. It operates in the soft material above the coal up to a distance of 75 or 80 ft. with a hole diameter of 4 to 7 1/2 in., depending on the explosive to be used. Sometimes alternate holes are drilled above and below the cap rock. Like other auger drills, the horizontal machine needs no water and is self cleaning.

All types of heavy drills are crawler mounted and travel under their own power. Light-weight horizontal pit drills usually are mounted on steel or rubber-tired wheels and generally are moved from hole to hole by hand.

Motors and controls for drilling machines should be waterproof. The industry is learning that such construction reduces maintenance because working parts are kept clean and dry. Ball or roller bearings in the driving motors are a practical necessity, as they stand shock better than the sleeve type. This is particularly true of churn drills.

Sturdy filament 32-volt lamps for night lighting are another practical requirement. They last for long periods, compared to higher voltage lamps, under the continuous jarring of drilling. They may be operated from 220- and 440-volt circuits through small dry-type transformers.

Water a Problem

The water supply for vertical drills is a serious problem in freezing weather. A water system consists of a convenient pond, a constant-pressure motor-driven pump in a frostproof or heated house, a distribution system of steel pipe laid below the frost line and the necessary hose connections from frost-protected valves to individual drills. In freezing weather these hoses must be drained at the end of the last working shift of the day.

In the event metal pipes freeze, an electric arc welder will furnish ample current to thaw them out quickly by attaching the welding cables to the two ends of the frozen section. Since dry ice, as well as rubber, is a non-conductor of electricity, a high pressure steam cleaning unit will work better on a frozen rubber hose.

The pattern for drilling is highly important. It will depend on the kind and depth of overburden, the type of

shovel used, whether the work is an open cut or box cut and the type and quantity of explosive or breaking medium used. The pattern must assure the two necessary conditions for good stripping: fragmentation and displacement. Fragmentation is necessary to enable the dipper to scoop up and hold all the chunks of hard material. Displacement enables the dipper teeth to readily cleave or separate the broken rock and plow through. A dragline requires better fragmentation than a shovel and therefore drilling and blasting are modified to that end.

There are two practices as to where drilling is done in relation to the stripping shovel position—leading or trailing. Explosive engineers are inclined to favor the leading position because drilling is then far enough "inland" to avoid the possibility of caving the high wall. Such an accident may easily cover a man, a truck or a pump. It has even stalled shovels so they had to be "dug out." When drills trail the shovel, care must be exercised to have the pit clear when the shot is fired. It has been proved that "inland" shots, even single shots, can reduce a tough high wall to good digging.

Because no two pits are alike, it is impossible to make accurate general statements relative to strip-mine blasting procedure. Seldom is the overburden identical throughout one pit. It is important to break up the overburden to make digging easy, yet the coal should not be "chilled"—shattered by the overburden explosive. One railroad fuel inspector insisted that chilled coal had entirely different burning characteristics from coal not chilled. He examined the effect of blasting shots on the coal and refused to accept badly shattered coal. Others, however, cite a wide difference of opinion as to how much the coal is shattered by shooting the overburden. One preparation engineer, noting that it is necessary to shoot harder for draglines, nevertheless pointed out in his case coarser coal was obtained from the dragline work. Production from the shovel pit ran 52 percent minus 14-in. coal; dragline pit, 42 percent.

How Explosives Work

The efficiency of explosives is measured by the volume of gas produced, the temperature the gases attain and the rate of detonation. The volume of gas measures the displacing power necessary to separate the rock fragments so the shovel will plow through them readily. Temperature is a sort of measure of the volume of gases, for high temperature produces a large volume of gas by expanding it. The rate



A die-sharpened churn-drill bit that has just been forged. Die-equipped forging machines do an exact job and improve drilling results.

of detonation, or speed at which the explosion takes place, is a measure of the fragmentation power. Easy digging is dependent on fragmentation and displacement. Not only the quantity of work a shovel does but low maintenance depends on how well these two things are done.

Measure Against Job

Whether the explosive used is a gelatin or an ammonia dynamite, or one of the several liquid oxygen-carbon cartridges, the drilling pattern and the weight of the charge must be adequate to produce a high wall that can be dug with the equipment at hand. Cheaper coal cannot be produced by doing a cheap job of preparation. It is evident that this most important job at the mine should have qualified, careful supervision. It is a case where prevention (of shovel damage) is far less expensive than cure.

Ammonia dynamites cannot be used in wet holes without some form of protection. One device is a tubular sheath made tight by gluing or tying the ends. Gelatin dynamites and liquid-oxygen explosives may be used in wet holes. The latter usually must be fired within about 30 min. or evaporation of oxygen will reduce or destroy its effectiveness. However, liquid-oxygen duds are harmless when a shovel digs into them a day or two later.

It is common practice to use a single cap in each charge of explosive. Where the nature of the overburden makes it necessary to split the charge and separate the splits, with stemming, a cap is inserted in each section.

At least one case has been noted where two caps were used under the assumption that the cost of the extra cap was small insurance against the loss of the explosive with attendant trouble and lost time. All caps of a charge are connected in series and fired with a blasting machine.

Group Shooting Best

Group shooting gets the best results because of greater displacement. It is customary practice where the holes stand up until all are loaded. Even caving holes may be fired in groups by loading each hole as soon as drilled, then letting them stand until the drilling and loading of the group is completed. Sometimes this method cannot be used with liquid-oxygen explosives because there is not time to finish drilling. However, some organizations have been very successful in firing single shots where caving holes prevented group shooting. It has one advantage. There is less explosive lying around and, therefore, less hazard for men and equipment.

The early practice of manufacturing liquid oxygen by small individual plants located at the mine has been largely superseded by liquid-oxygen storage tanks supplied by tank cars or tank trucks. The principal objection to a liquid-producing plant on the job is the fact that it has a fixed capacity whereas the demand for explosives often fluctuates widely. With a storage tank there is always a supply of liquid when and as required.

Strip-coal mines are among the largest users of explosives. It is not unusual to find from 100,000 to 200,000 lb. of explosives used per month in a single operation. It is not possible, however, to generalize on the quantity of explosive used per ton of coal mined because this varies with the overburden encountered and the thickness of the coal. Overburden yardage per pound of explosive varies also because it naturally requires more explosive to shoot limestone than shale. From the wide variety of explosives available the one that gives the best preparation at the lowest cost should be chosen for use at the particular operation if the best results are to be obtained.

The blasting problem at any particular mine must be solved on the job. The comparison of blasting costs at two mines is meaningless unless accompanied by a comparison of the two overburdens. There is no mystery about explosives. They are tools the industry must use. Blasting is an engineering problem for which there usually is an answer. Its importance merits the utmost consideration and the best supervision.

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MECHANICAL MINING

Supplements Stripping at Burning Star

Heavy Overburden Dictates Moving Stripping Equipment and Going to Underground Mining With Loading Machines and Shuttle Cars—Supplemental Coal-Storage Facilities Assure Uniform Production

WITH INCREASING DEPTH of overburden making stripping less attractive at one location of the Burning Star mine of the Truax-Traer Coal Co., Elkville, Ill., it was decided to go underground at that point, where the overburden over the 7½-ft. vein of Illinois No. 6 coal reached 65 ft. Consequently, the stripping equipment was transferred to a more favorable section and full mechanical deep operation, using crawler loaders and shuttle cars, was adopted.

The final stripping cut offered opportunity for the immediate production of coal by drift mining. Besides increasing production at the time war activity demanded maximum output, this development offered two other important advantages: It recovers coal that might otherwise remain underground and stockpile storage levels off washery output and permits operation as much as a week on stored coal.

Opposites Prevail

In many respects, strip mining and underground mining require opposing conditions of overburden. Soft digging is inviting for stripping but offers difficulties in underground mining. Too deep cover precludes stripping but may result in favorable conditions for normal underground mining. Black slate with heavy limestone makes an excellent roof for deep mining but is expensive to excavate. Two years of successful operation have proved the wisdom of combining the two methods of mining in this operation.

The underground workings were driven directly into the coal from the final stripping cut. The original working plan, followed until recently, was based on a three-heading main entry, three-heading cross entries at 90 deg. off the main entry, and rooms driven parallel to the main and away from the portal. A 400-ft. block of coal is left between each two sets of cross entries for room-and-pillar mining. The recent change in plan increases the number of headings per cross entry

from three to five. This produces more coal from development work yet slows down development footage very little.

Main headings are 12 to 14 ft. wide and are driven on 42-ft. centers. Crosscuts are the same width, driven on approximately 60-ft. centers and at a 45-deg. angle. Crossheadings are the same width as main entries but on 34-ft. centers. Crosscuts between cross headings are the same width and are driven at right angles, lining up with

the room necks; this to provide a straight roadway from face to pit car for the shuttle cars.

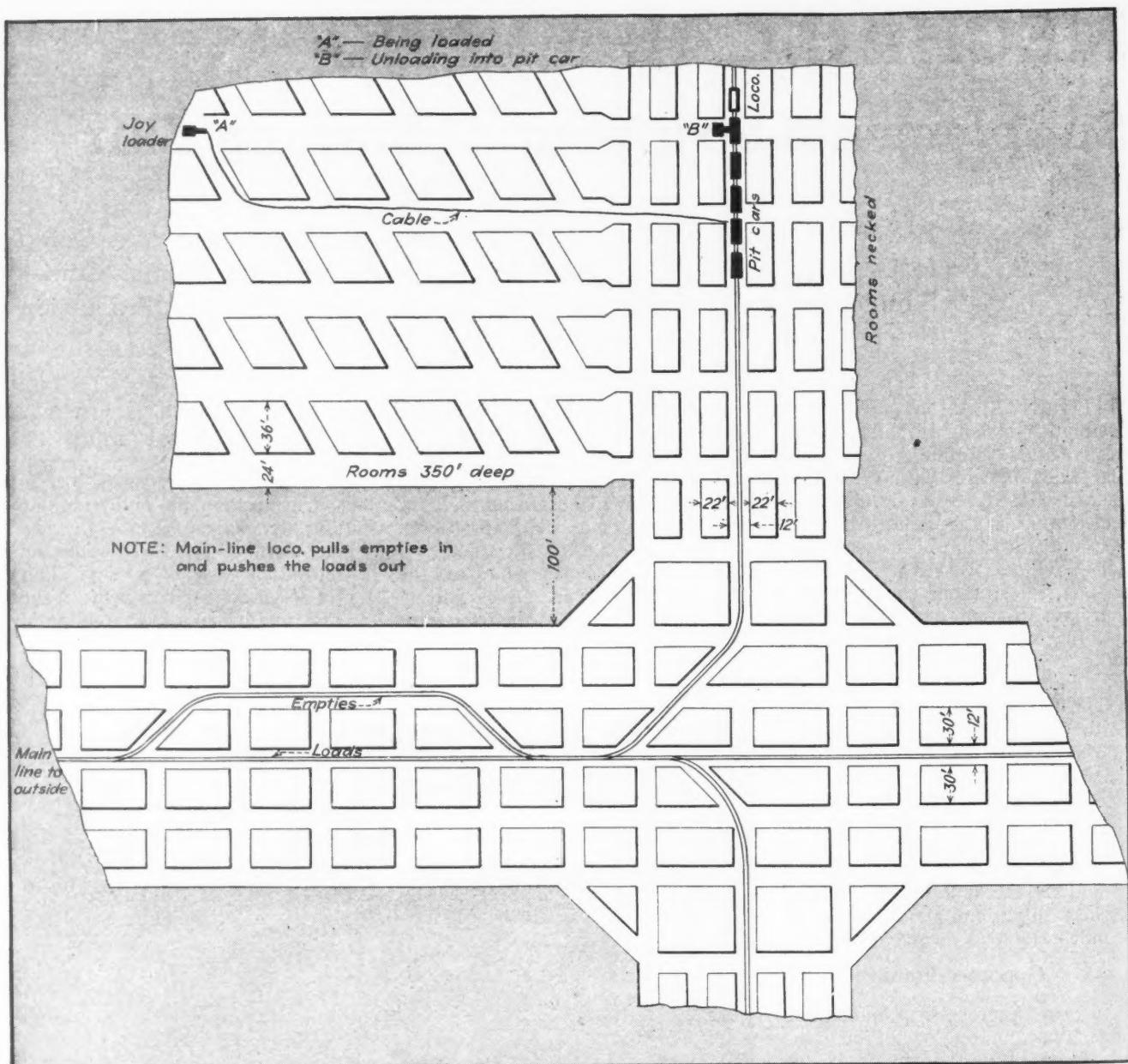
All rooms are driven on 60-ft. centers, starting from the outby heading of the entry, and are 22 to 24 ft. wide. Room crosscuts are 14 ft. wide and driven at an angle of 60 deg. This leaves 36- or 38-ft. pillars between the rooms, from which a large tonnage of coal is recovered on retreat. This recovery is accomplished by mining out



Shortwall cutter mounted on a modified 1½-ton Ford truck. Ready to leave the shop.



Crawler-mounted universal machine ready to shear a corner for clearance.



The five-entry plan of operation at Burning Star provides two loading points for the two shuttle cars serving the same loading machine to prevent cable interference.

the pillar center, leaving a 6-ft. thick rib on each side. In all workings the aim is to leave about 18 in. of top coal to support the roof.

The mine is divided into four operating sections, each under the direction of a foreman who carries a sounding bar and a safety lamp.

Considerable pyrites is found in the bottom of the vein, so much that bottom cutting had to be abandoned in favor of cutting above the "blue band" where the coal is free of hard impurities. In addition to cutting $2\frac{1}{2}$ to 3 ft. above the floor, entries are sheared in the center from bottom to top. This lightens the explosive charges and makes for a better roof.

The complete equipment set-up for a section consists of one cutting ma-

chine, two coal drills, one loading machine and two shuttle cars. A total of nine men under each foreman is a coal-production crew on each shift. In addition there are timbermen, trackmen, maintenance men, motormen and trip riders underground.

The four coal-producing operations are undercutting, drilling and shooting, loading and shuttle-car haulage to the trips of pit cars. From the working face to the pit car it is all trackless mining. That is, cutting machines, loading machines and shuttle cars are mobile units, traveling on the mine floor under their own power with current supplied from adjacent power lines through portable cables.

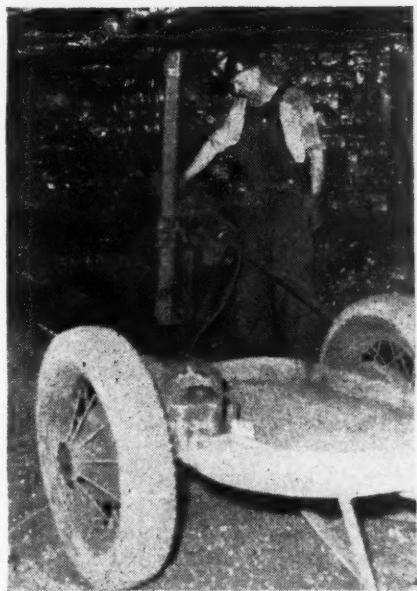
Two types of cutting machines are employed, each equipped with a 9-ft.

cutter bar and a staggered 9-position chain. Two units are Jeffrey 29-U caterpillar-mounted universal machines, which are used largely for development work because they can shear as well as undercut. The other two mining machines are Sullivan 7-B units which have been mounted on Ford 1½-ton trucks at the mine. So arranged, they might be called arcweld machines. To assemble this combination, the trucks were stripped down to the chassis, including the engines. An extra wheel was added to each rear wheel, making them double. This was necessary to carry the weight of the cutters. Tires on the rear wheels are 7.00x20. The engines were replaced by small mining-machine motors for driving the trucks. To cut traveling

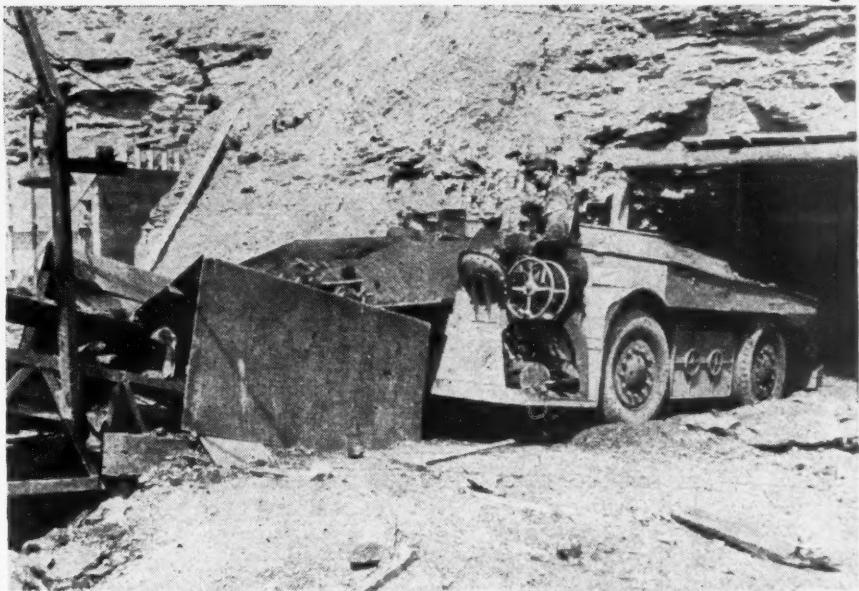
speed of a second tandem shift lever inoperable truck lever varied On the of the circular is faster ing-machine guides and keep horizontally lower machine which in either move for sheaves ropes inbly designed personnel sentative work was by miners



Shuttle



Post drill and hand truck at the face.



Shuttle car at portal discharging into conveyor during early development.

speed down to underground standard, a second gearshift was mounted in tandem with the truck shift. Both shift levers were preset and rendered inoperative, making the speed of the truck low and so that travel may be varied only by the controller.

On the rear of a chassis, just ahead of the rear axle, is mounted a heavy circular steel plate. A matching plate is fastened to the bottom of the mining-machine frame. A center pin and guides hold the upper plate in place and keep the cutter-bar lined up horizontally. Four arms, welded to the lower plate, carry hooks to which the machine ropes are attached and by which the machine is made to swing in either direction or the truck to move forward in sumping. Some rope sheaves were added to maneuver the ropes into feed position. The assembly design was worked out by the shop personnel and the local Sullivan representative. Mechanical and electrical work was all done in the mine shop by mine employees.

In using the 29-U, the machine backs out until the bar clears the face when the cut is completed. Then, with the bar in a vertical position, it is swung to and fro to rake cuttings far enough away to clear the face so that drillers may reach the bottom hole positions without shoveling.

Each drilling crew of three men is supplied with two post-type electric auger drills, hand tools and a rubber-tired cart on which the equipment is moved from place to place. Two makes of drills are used—Dooley and Jeffrey. The augers and wedge-held bits are Drillmaster.

Top drillholes are inclined upward to reach the parting line at the back. In similar fashion, the bottom drill holes slope down to near the bottom of the vein. The lower holes are shot first and the top holes last. Permissible powder is used.

All coal loading is done with Joy 11-BU machines.

The ten shuttle cars are Lee-Norse and Joy-Lee-Norse (two of the latter)

cable-reel four-wheel-drive four-wheel steering "Koalmobiles," each equipped with four 3-hp. series motors and a discharge conveyor. The reels can accommodate 750 ft. of cable if necessary. This mine uses 450 ft.

Four-wheel drive and four-wheel steering provide 100 percent traction and cars can be handled in close places. The discharge elevator loads pit cars without a transfer station. The later cars have several improvements, including the brakes, which are air controlled with air from an independently motor-driven compressor. The hand-operated air control makes brake applications exactly as needed. Brakes are applied by hydraulic pressure similar to automobile brakes. A further improvement was replacing the independent discharge conveyor with an extension of the main conveyor, simplifying mechanical design by eliminating several moving parts.

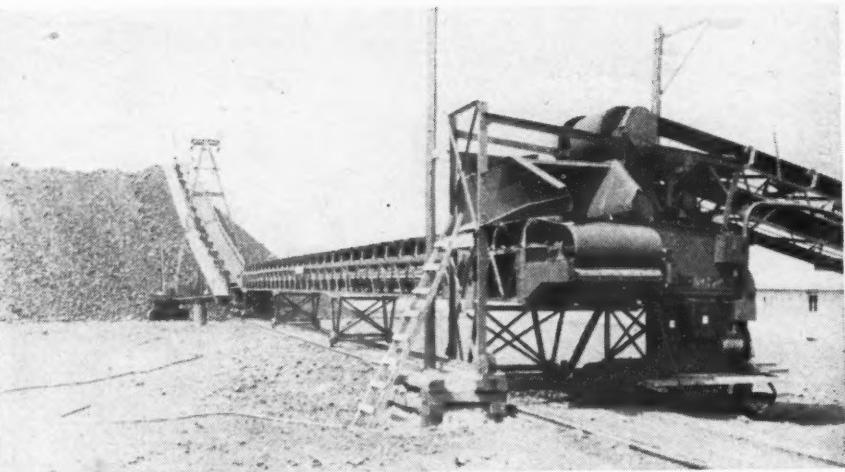
Two shuttle cars normally serve one loading machine. They deliver coal to a train of pit cars, each shuttle car



Shuttle car discharging into 8-ton pit car underground.



Trip of eight cars being pushed through the old strip cut.



Shuttle conveyor used in stockpiling. Note track mounting. Stack at far end.



Transferring stored coal to strip-haulage unit for transportation to the washer.

using its own crosscut for reaching the train, when possible, to avoid cable entanglements.

Small repairs and replacements are made at the face. For this purpose a shop and small stock of parts and supplies are maintained in a crosscut near the working point.

Mine ventilating air is supplied by a 6-ft. Hartzell high-speed multipropeller fan mounted on roller bearings. Its capacity is 44,000 c.f.m. The fan is set in a wall with no intake or discharge ducts and is driven by a 20-hp. motor.

Rail haulage, which includes relay work, is over a 42-in.-gage track of 60-lb. rail laid on 5x5-in.x5½-ft. sawed ties. Length of the haul is two miles, 1½ being outside from portal to washery. Track inside the mine has some short grades in both directions, averaging fairly level. Climbing out of the

cut, the outside track is approximately 1½ per cent against the loads.

At the washery the track spans the raw-coal bin into which both pit cars and strip-pit trucks dump coal. The rail track and truck roadway are side by side. Just before reaching the washery, a second dumping bin is provided under a rail siding to receive coal for the stockpile.

The overhead trolley material is Ohio Brass. Inside the mine it is supported on the roof in the customary manner, but the lines are extended beyond the haulage tracks to carry power to points that may be reached by trailing cables from the face. The outside portion of the trolley is supported on combination wooden post-brackets secured to long ties set in the track at intervals. This represents real wartime conservation of materials. The lumber is from local mills.

Rolling stock for the rail haul consists of six used trolley-type mine locomotives and 45 Sanford-Day 8-ton all-steel drop-bottom pit cars with Timken roller-bearing wheels. The locomotives were overhauled in the mine shop, the track being extended into the shop for convenience in repairs and conditioning. All are equipped with steel-shoe current collectors. The trolley wire is lubricated at intervals with Ohio Brass lubricators. The four large mine-locomotive builders are represented in this group of locomotives. An additional 25 duplicate pit cars were to be added to increase tonnage at the time this article was prepared.

For stocking, coal is conveyed from the auxiliary dumping bin by a steel apron conveyor and discharged onto a Barber-Greene shuttle conveyor and from that to a Barber-Greene portable stacking conveyor. The shuttle conveyor is 90 ft. long, mounted on wheels, and may be rolled to any position on its 200-ft. track. It can receive coal at any point along its length, is reversible, and may discharge from either end to the stacker.

Storage Mechanized

The stacker is 90 ft. long, with means for wide adjustment of discharge height. Its weight is largely carried on two motor-driven caterpillars which move it to any point parallel with the shuttle conveyor track, on which the free end rests. Both stacker and shuttle conveyor are equipped with 36-in. rubber belts. Both are motor-driven and are controlled by pushbutton stations located at the car dumping point. Power is carried to both conveyors over portable electric cables.

The storage facilities have a capacity of 30,000 tons of mine-run coal about 200 to 500 ft. from the washery. When stock coal is required at the washery, it is loaded by electric shovel into strip-pit trucks and dumped into the washery raw-coal bin.

Power for underground operation, including haulage, is supplied by four motor-generator sets housed on the surface. They deliver power over the 4/0 trolley wire and additional feeder.

Mine output when this article was prepared was approximately 2,300 tons a day.

This successful auxiliary to a strip mine was planned and developed by the management of Truax-Traer Coal Co., including T. G. Gerow, vice-president; F. A. Huff, superintendent, Burning Star Mine; P. C. Henderson, mine manager for underground production; and A. P. Doctorman, mining engineer for Burning Star.

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BATTERY GATHERING

And A.C. Cutting Serving Mine 22d Year

A.C. Mining Machine Power and Capacitors, Plus Battery Gathering Help Keep Power Cost Low—Locomotive Battery Capacity Upped One-Half Without Height Increase—Battery Life Runs 10-12 Years

By J. H. EDWARDS
Associate Editor, Coal Age

GATHERING 90 CARS over unfavorable grades with plenty of charge left at the end of the shift is not an unusual performance with the rebuilt storage-battery locomotives used at No. 4 mine, Spruce River Coal Co., Ramage, W. Va. Gathering exclusively with batteries, use of a.c. machines for cutting and a capacitor installation for boosting power factor have kept this mine in a low power-consumption and cost bracket.

Spruce River purchased its first battery locomotive in 1915 and it was the first unit sold by its manufacturer. A. W. Pollock, vice-president and general manager, who has had over 20 years' experience with battery gathering at Ramage, sees many advantages in that system combined with a.c. cutting. A. E. Epling is superintendent and chief engineer at Spruce River No. 4 mine, with Avrial Cook as chief electrician and J. S. Henry as mine foreman. F. F. Taggart, president, now residing at Massillon, Ohio, was instrumental with Mr. Pollock in the early selection of battery gathering and a.c. cutting (Coal Age, November, 1929, p. 669).

Helps in Low Top

Of the total seam, the Alma, 44 in. is the average mined. Thus, in many places, the top is rather low, making the absence of trolley wires in the sections a distinct safety advantage. The coal is hand loaded into cars averaging 2.38 tons. A laminated bone streak 3 in. thick is picked out at the face. Of the daily production, 950 tons, all handled on one tipple shift, about 75 percent is loaded into mine cars on the day shift and the remainder at night, during which time 50 percent of the cutting is done.

The mine, on the Coal River Branch of the C. & O., in Boone



Dumphouse, belt conveyor and tipple, Spruce River No. 4 mine.

County, is a drift operation with the main portal close to the dumphouse, from which the coal is carried down an easy grade by a belt conveyor to the tipple. The shop, substation and battery-charging barn are on the outside near the portal and dumphouse.

Seven 6-ton locomotives constitute the gathering equipment. Over the years of operation of these locomotives Edison batteries have been used principally and at present are employed exclusively. Battery boxes are of the built-in non-removable type and no extra batteries are kept.

Two of the locomotives are Ironton Type WO, both with 88 cells, rated 450 amp.-hr. Two others are the same make but Type D, one with 88 C-8 cells and the other 80 A-12 cells. The remaining three locomotives are Mancha "Mules" and these have been rebuilt to accommodate batteries consisting of cells of two types: 61 C-8 and 19 A-12. After redesign to accommodate these mixed-type batteries the three locomotives now have 50 percent more capacity than when originally equipped with 80 A-8 cells.

Ampere-hour capacity is now 450 instead of 300.

These Mancha locomotives are turtle-back units, 34 in. high, with battery compartments in the front end, in the center and on each side at the rear. Locomotive design and mine height limitations precluded putting higher cells in the center compartment, but it was found practicable to rebuild the other three compartments (front end and two sides at the back) to accommodate the higher, larger capacity C-8 cells.

Capacity Increased

By changing the design of the brake rigging it also was found practicable to widen the center compartment sufficiently to take four trays of A-12 cells. One tray has four cells and the other three five cells each. The front compartment has eight trays of five C-8 cells, two trays of four C-8 and one tray of three C-8. One of the side compartments at the rear contains two trays of three C-8 and the other two trays of two C-8.

Original ampere-hour meters with

which the locomotives were equipped were discarded many years ago in favor of using the Edison charge-test fork. From this reading of a pilot cell with resistance load applied, the exact duration of time for recharging is determined. Elimination of the ampere-hour meters originally supplied on the locomotives, which often were damaged by mechanical shock, effected a considerable saving by eliminating meter maintenance and is easier on the batteries because the meters often went wrong and caused overcharging.

Life 8 to 12 Years

Eight to twelve years is the service which Mr. Pollock reported that he has been getting from the Edison batteries. A battery now in Locomotive No. 13 was installed Oct. 19, 1933, and its condition at the time of this writing indicates it should be replaced in the second quarter of 1944. At present, due to labor shortage and absenteeism, all of the storage-battery locomotives are not in service and, as a group, the batteries are not being worked to capacity. It is calculated that absenteeism at the mine now amounts to about 20 percent of the productive labor.

Direct current at 180 volts for charging is delivered by a 100-kw. synchronous motor-generator. Watering of each cell of all batteries is done every day at the close of the shift just before the battery is put on charge. From an elevated wooden barrel, with



One of the 42-in. high 80-cell locomotives bringing a trip out of 13 West onto No. 7 Main.

hose connection, filling with distilled water is accomplished quickly by use of an Edison alarm-type filler.

Gathering grades in some sections have averaged 3 percent against the loads and in a few instances the batteries have worked against adverse grades of 5 percent for distances of 200 ft. Now, about 50 percent of the tonnage is gathered over unfavorable grades and the balance favorable.

Practically all the cutting is done with five Goodman 220-volt a.c. universal shortwall machines. A 250-volt d.c. standard cutter of the same make

recently was put into service because of difficulty in obtaining three-conductor cable to extend the 2,300-volt underground distribution for moving a transformer substation. Life of trailing cables on the 220-volt a.c. machines is about seven years; that is, for cables with high-grade rubber jackets. These cables are three-conductor size No. 3.

Five of the transformer substations are now in use and each consists of three 15-kva. oil-filled 2,300/230-volt transformers in rooms lined with concrete blocks or tile. To compensate



Left—Daily test of a pilot cell with a charge test fork determines charge required.

Below—Without increasing the height (34 in.), three of these turtle-back locomotives were rebuilt to accommodate 50 percent more battery capacity. Two types of cells are used in each locomotive. Batteries are watered at the end of each shift. Filling is done quickly and accurately with an alarm-type filler.

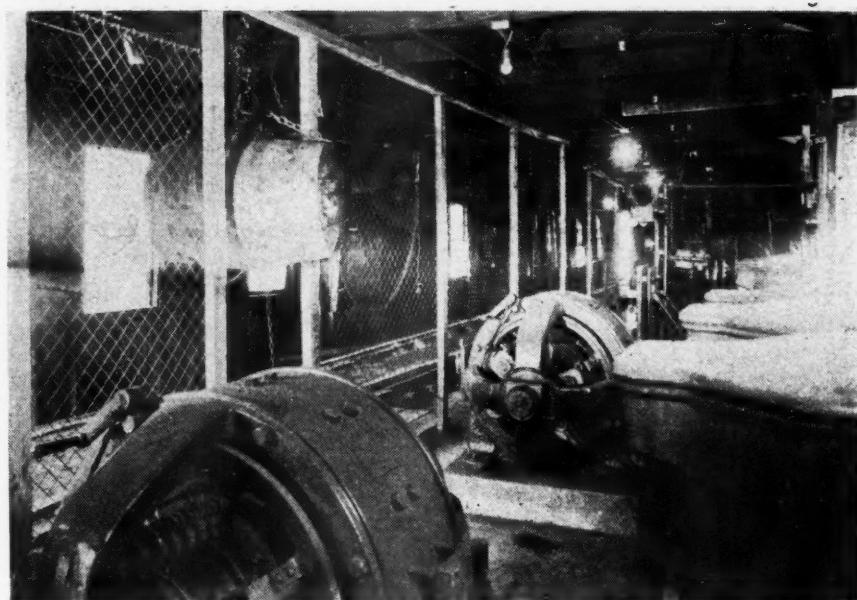


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Two substation converters appear in foreground, with a synchronous m.g. set for battery charging at the rear. The barrel hanging on a chain hoist contains distilled water. The charging track is on the other side of the screen.

for an oversight when the original transformers were specified without 10-percent taps, three additional 3-kva. 2,300/230-volt transformers were installed in each room to boost the output voltage from 230 to 253. Substation rooms are on separate air splits so that smoke from a fire therein will not reach any working place or haulway. The mine was opened and the a.c.-cutting installed in 1922 and to date there has been no fatal accident

on the 2,300-volt power and no transformers have burned out.

The 2,300-volt cables are Okonite "Parkway," Size No. 6, insulated with varnished cambric for 5,000 volts and protected with lead, steel ribbon and jute. Maximum distance for this a.c. 2,300-volt transmission is 7,500 ft. and the cables are suspended from the roof along headings not used as haulways. Haulway crossings are made under the track in conduit surrounded by con-

crete. Cables are sectionalized every 2,000 ft. by disconnects. Fused cutouts constitute the typical transformer protection. However, one substation has been fitted with an oil switch.

The usual limit of transmission of the 220-volt a.c., from delta-connected secondaries, ungrounded, is 2,000 ft. It is carried by three No. 2/0 bare solid copper wires supported on porcelain spool insulators one above the other on posts set along the rib 25 ft. apart. Knife switches in each substation control these circuits.

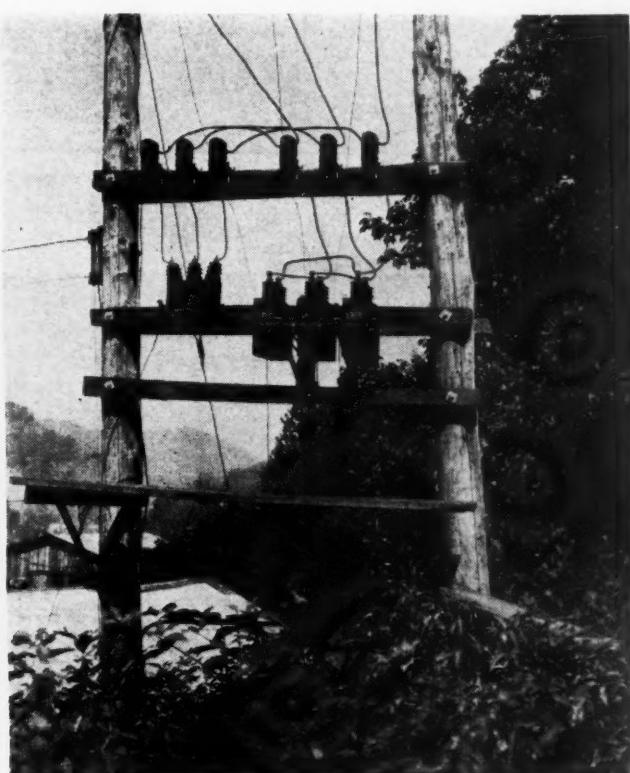
3.75 Kw-Hr. Per Ton

Power for the mine is purchased from the Appalachian Electric Power Co. and during the 12 months August, 1942-July, 1943, inclusive, energy consumption per ton was 3.75 kw-hr. During that period 250,000 tons were shipped. Fifteen-minute maximum demand averaged 270 kw. and the total cost for power was 5.76c. per ton.

Those figures are given added significance in view of the other equipment at the mine and conditions of operation. Over the main haulage, handled by trolley locomotive, about one-fourth of the tonnage is hauled 8,000 ft., another fourth 3,000 ft. and the remainder 1,000 ft. That a mine opened 22 years ago should have a haul of only 1,000 ft. from one section is explained by the fact that this part of the work is robbing of pillars left standing pending a demand for coal which would insure the full-time operation considered necessary for sec-

Right—Three capacitors (lower right) are mounted near the substation to raise power factor and improve voltage regulation. A small three-phase capacitor at the left is used for lightning protection in connection with pellet arresters.

Below—A.c. machine cutting a chain pillar on 5 Right off 5 Main. Trailing cables are three-conductor size No. 3.



ond mining. Main hauling is done with two 8-ton Jeffrey MH-100 locomotives and one Westinghouse Type 906 unit of the same weight.

Rooms are driven 25 ft. wide on 75-ft. centers 300 ft. deep. The roof is favorable to leaving pillars standing for many years before recovery. Some now being mined have stood 20 years. Shot holes are drilled by hand and the explosive used at present is Austin RD11 permissible. Transportation

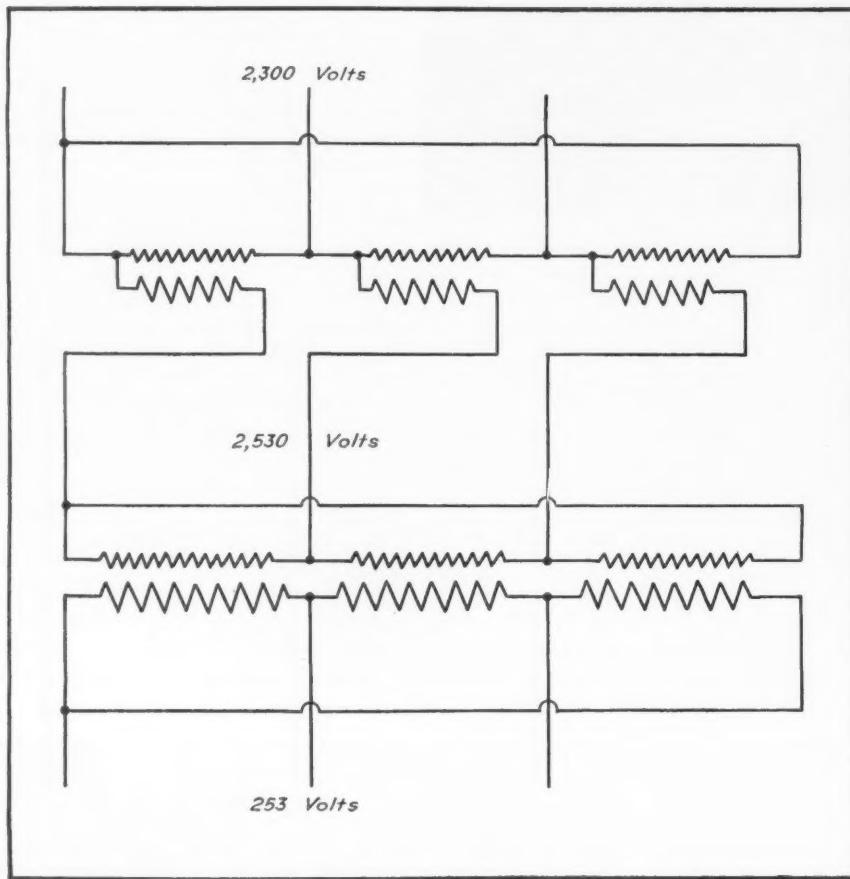
equipment consists of 300 wooden cars, average capacity 2.38 tons, in heights ranging from 30 to 34 in.

Of the nine mine pumps used during the last winter season, all are on alternating current. Seven are small reciprocating units with 3- to 5-hp. motors and two are centrifugals with 10-hp. motors. During the past summer six of the pumps were kept in operation. Ventilation is provided by four small fans, all a.c., with the larg-

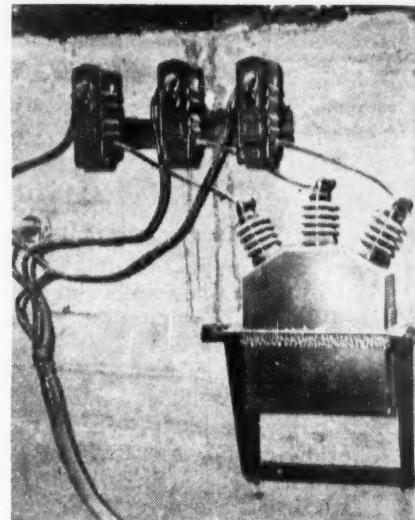
est requiring a 10-hp. input. For lifting bottom in rooms and entries on one side of the mine where the coal is but 40 in. thick, the company recently purchased two Cantrell portable air compressors with 15-hp. motors.

Electrical Load Is Light

The electrical load of the three-track tipple, served by a 36-in.x385-ft. (c.-c.) belt conveyor and equipped with screening and crushing facilities and three loading booms, is light. Motors are powered from 440 volts and the largest is a 50-hp. unit driving the belt, feeder, picking table and screens. Except when starting, it uses



Line voltage is boosted 10 percent by small transformers connected ahead of the underground section transformers.

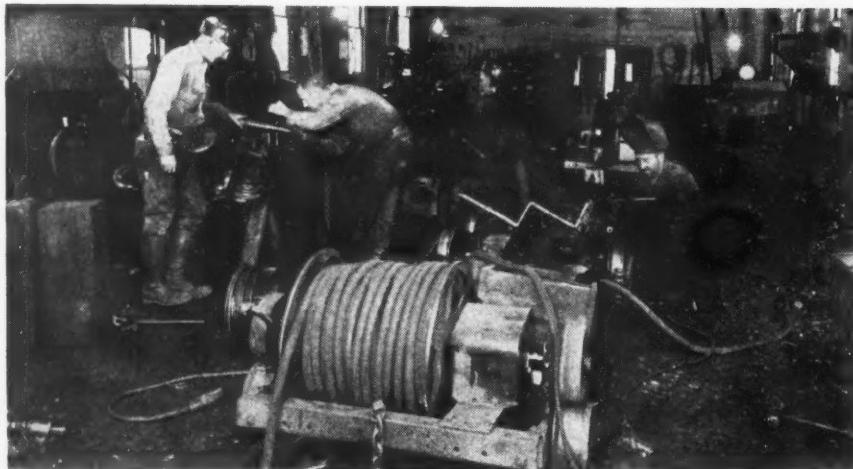


Capacitor (15 kva.) in an underground transformer room at the end of the 2,300-volt cable.

little power, inasmuch as the descending coal causes the belt to put some driving torque on the motor. A d.c. larry car formerly used for refuse disposal was replaced a few years ago by a Ford dump truck.

Direct current at 250 volts for the main haulage locomotives and for the one d.c. cutting machine is furnished by two 100-kw. General Electric converters in a building which also houses the battery-locomotive charging track.

Power-factor for the total mine load ranged from 88.5 to 97 until September, 1942, when two 2,300-volt Cornell-Dubilier capacitors were installed. Now the range is 99.5 to 100 percent. One capacitor, 15 kva., is underground at the end of the 2,300-volt cable and the other, 45 kva., is on a pole structure near the substation.



Mine shop where the locomotives were rebuilt to increase battery capacity.

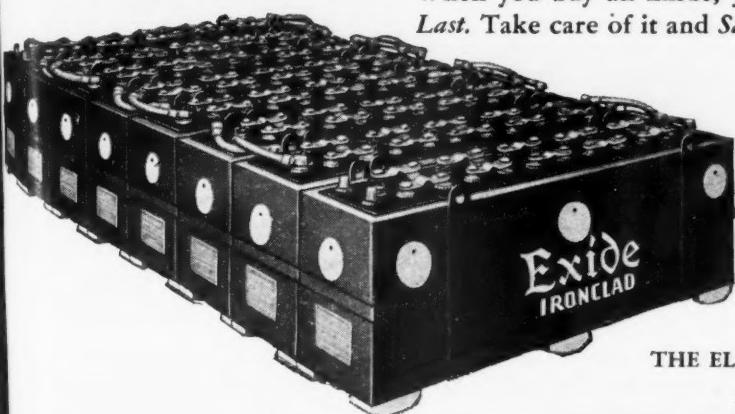
EXIDE'S PART IN THIS WAR OF MOVEMENT BEGINS UNDERGROUND



From face to tipple; from tipple to consumer... there is motion, movement, progress. It is every-day routine, yet the steady movement of coal is a basic factor in the continued, successful operation of America's production lines.

In coal mines all over the country, battery-powered locomotives and shuttle-cars run the first lap of the relay. Most of them are powered by Exide-Ironclads, which deliver all the power needed to meet every demand; and, which assume a uniform work speed all day long.

The traditional long-life, dependability, and ease of maintenance of Exides is a guarantee of economy. When you buy an Exide, you *Buy to Last*. Take care of it and *Save to Win*.



THESE RULES WILL ADD TO ANY BATTERY'S LIFE:

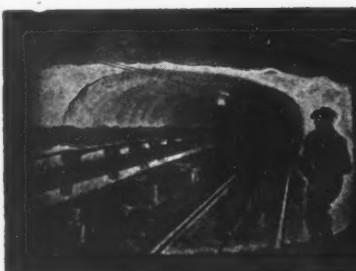
- 1 Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
- 2 Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
- 3 Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
- 4 Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery maintenance problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.

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Philadelphia 32

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THE FOREMEN'S FORUM

Is Purity of Water Mine Roof's Undoing?

Fresh Water Free From Earthy Salts and Carrying Dissolved Oxygen, Admitted in Mining Coal Below Water Level, Dissolves Rock Cements

WATER rarely descends to great depths below the surface, especially over coal beds, because of the gases which fill the interstices of the rock strata, thus making percolation difficult and, in fact, it usually goes down only to levels which are above nearby escape spots on the surface such as valleys, streams and rivers. Water entering the ground, unless it has traveled far from where it fell as rain, is relatively free from salts and so has an ability to dissolve such salts as it passes on its way to the points of exit we term "springs."

In so doing, it dissolves salts, thus opening channels through which other water can pass with little resistance. Water that has far to travel dissolves so much salt in its way that its appetite gradually is satisfied—in technical language it "becomes saturated" and can dissolve no more salts, and therefore the channels do not become so readily travelable.

Why Nothing Happens

No Travel, No Solution—Where there are no outlets or only extremely distant outlets, the water becomes completely saturated and incapable of dissolving anything more; thus the rocks remain unaffected by solution.

Moreover, the rocks become oxidized by the oxygen which the moisture trapped as it passed as a cloud through the skies and as rain when it fell to the earth, but the supply of oxygen that the rain water carries is soon exhausted on the measures near the surface, so that water which passes, and is obliged for indefinite periods to stay below, the water level (because it is too low for any outlet as yet available) is either deprived of all its oxygen or soon becomes so and cannot injure the rock structure by oxidation.

Is Expansion a Chemical or a Physical Action?—It will be said by some, however, that the rocks, though they may not be chemically affected—that is, oxidized or dissolved—will, many of them, be greatly expanded by the moisture. This has been abundantly proved by more than one experimenter, but one cannot be sure that the expansion is not put in operation by

some chemical change, for as a rule those rocks that do so expand also soften and check.

Furthermore, those who contend that rocks far below the surface are moist find it difficult to explain why they expand so readily when immersed in tap water unless they concede that in some way the purer water used in such immersion has a different effect from that which is saturated and oxidized. Though tap water is not any too pure, it seems that this distinction has not been given due consideration. Is it not a fact that rock under mine water keeps its integrity while the same rock along the sides of a ditch disintegrates? Might not our coefficients of expansion increase mightily if based on tests with distilled or even with rain water?

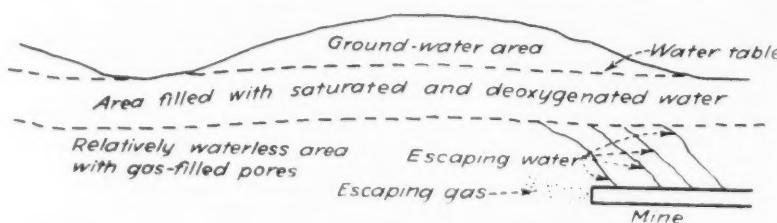
Carbon Dioxide With Water Forms Carbonic Acid—In some cases, however, there are large deposits of calcareous rocks, and the carbon dioxide from the coal impregnating the water and forming carbonic acid assists in dissolving the calcium carbonate and makes the water passages through the rock large and readily travelable by streams of water—one hesitates to use the word "permeable," for the passages may become quite wide. In this instance, the formation of an acid aids solution.

Mining provides an escape below the former water level, first for the gases and then thereafter for the water; in short, it usually lowers the "water table" down to the mine floor, though not always. The

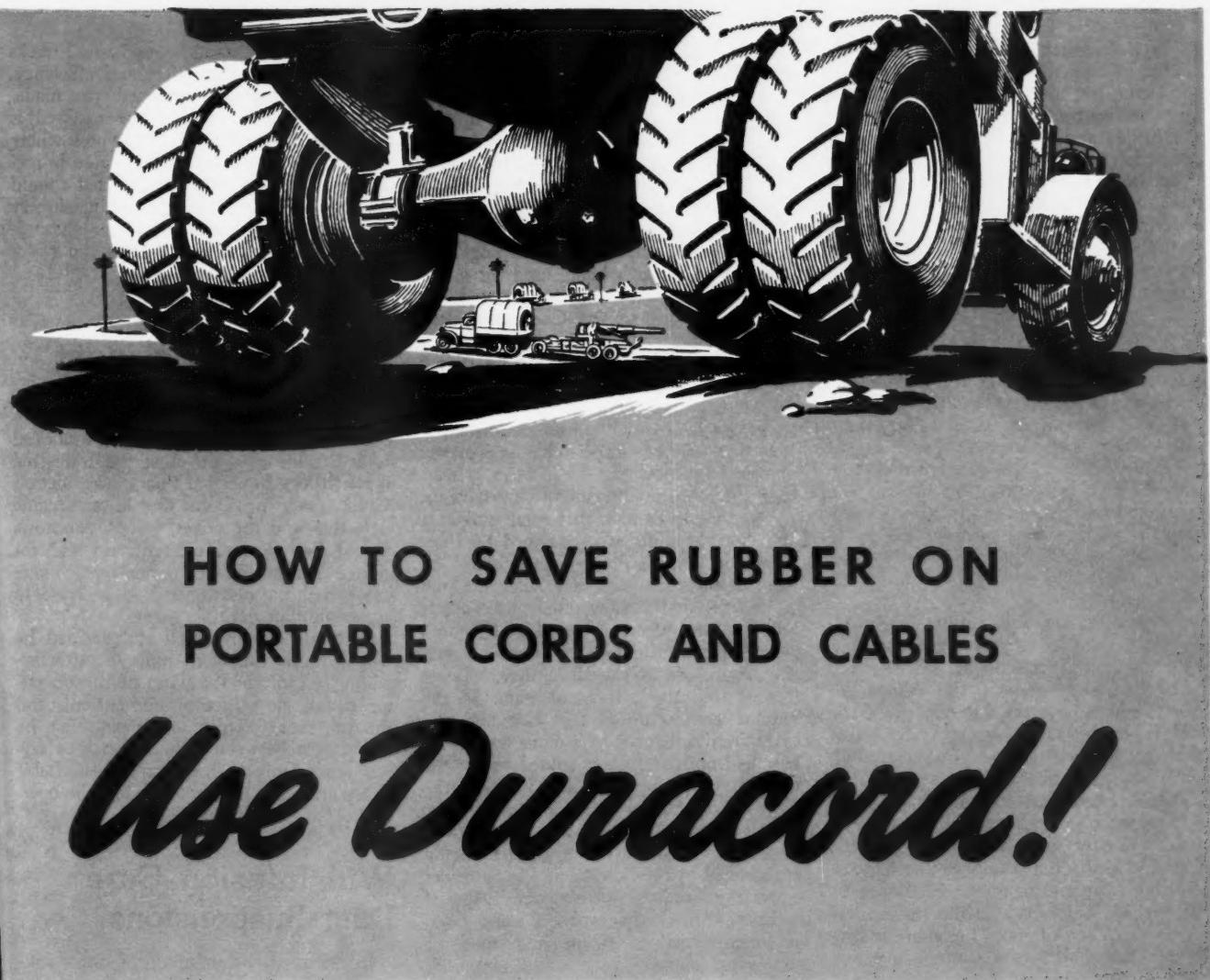
gases once released, the water they sustain is able to descend. The first water that arrives, being from below the water-level elevations, is saturated with salts and oxygen-free. It has to pass through the minutest of channels, but later it is followed by water less and less completely saturated and deoxygenated, and chemical action is progressively speeded both by reason of the volume of liquid and the chemical thirst of the purer waters received. The way being shorter, the action may be more vigorous than along the channels terminating at the surface as springs. Hence, rapid deterioration and expansion of the rock follows.

The Chemical Pause—This chemical action perhaps is the main reason why time is an element in roof failure; the "zero hour" is when the working place is started and a new water level is created. This probably is a far more active element in rock demolition than structural changes which make necessary horizontal slicings of one stratum from another and even slicings of individual strata, only to be followed by other destructive actions. There is both a chemical and dynamical pause between initial cause and manifest effect, and probably the first is the more important, but chemical changes and stresses aid and help one another in the work of destruction.

The ground below the water level being filled with earthy salts, the water is soon saturated with saline solutions so that it cannot act on the other rocks with which it comes in contact. Thus, the chemical



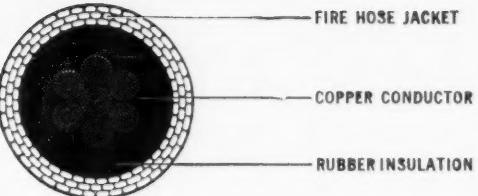
Three zones—solvent, non-solvent and waterless—all become active and ever more active when the mine noses its way underground and so provides an outlet for gas and water.



HOW TO SAVE RUBBER ON PORTABLE CORDS AND CABLES

Use Duracord!

Here's one way you can effectively conserve the critical rubber supply and still get long-lived heavy duty portable electrical cords and cables...with Duracord.



DURACORD* was developed during the last war to meet the need for super-strength cords and cables. This Anaconda construction has served in some places for more than twenty years and it is still in use today. It is *not* a new construction, adopted temporarily, because of the rubber shortage.

The Duracord cover, woven from long fiber cotton, like a fire hose, replaces the rubber jacket on all rubber cords, making possible rubber savings as high as 50%. See the cross-section above for the detail.

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This well-known, all-rubber companion to Duracord has been pre-empted for the toughest kind of jobs in the war effort. Until peace, its use will be strictly regulated.

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pause is lengthened. Probably the upper strata, in the main, are affected before the lower, but ultimately all are weakened by the solvent and oxidizing waters.

Distilled and Rain Waters—In summation, the escape of water downward to the mine instead of outward to the surface lets the imprisoned saturated deoxygenated water, which is chemically inert, pass down to the workings, and this water is replaced by fresher water from the surface which is chemically active. The vertical crevices and horizontal slicings that result from stress permit the water to reach the less permeable points of the roof, and as a result a certain degree of deterioration occurs which, however, leaves some of the rock almost unaffected chemically. Observation shows that pure waters, such as roof dews (in both intake and return), condensed steam, seepages from streams and rivers, and from floods which enter through cropfalls, drifts and crevices, are more destructive to rock than acid water. Condensed steam and dew are practically distilled moisture.

Impervious and Self-Healing Rocks—It has been objected that some rocks have such small and infrequent crevices and pores that they prevent the descent of ground water, both prior to, and after, the coal from the several areas under them have been mined. Some also, it is said, having material like clays and shales that expand when wetted, soon repair the damages which are done not only when the mine penetrates the coal seams below the clays and shales but also even the damage resulting from the complete extraction of the coal. At Coalwood, in the Pocahontas region of West Virginia, the mine is dry, though the shaft passes through a heavy body of water that has been collected and pumped from the shaft rings for use in the village as a domestic water supply.

Wells Self-Repaired

At Nemacolin, near Brownsville, Pa., extraction of pillars let water into the mines, but after a while the wells began again to fill with water as in earlier years. In this case, therefore, the roof was self-healing. These exceptions probably are not infrequent, but they cannot be regarded as normal.

Some Pervious Rocks—But, as is well known, may rocks will pass both water and gas. It is well known that the incursion of water drowns out natural-gas wells. The gas has kept out the water despite the tremendous pressures the latter exerts. If the gases are solidified or liquefied by pressure, this does not explain away the fact that the gases have held back the water and have been changed to liquids or solids under its pressure and under the rock pressures.

Methane also passes from coal beds to the surface. Where rivers are above the coal beds, bubbles often can be seen rising through the water, as in the Susquehanna River, of Pennsylvania, and in the Rhondda Valley of South Wales, though in the first case the bubbles are less frequent now, and in the latter instance it is said that no longer can they be noted. It was "great sport" for boys to set fire to such gases, and that they were present testifies to the fact that the gas often is emitted from coal

beds at a higher pressure than that of the water that incloses it and so in the case of a drowned-out shaft or slope will drive the water down in the working and, in consequence, will raise it in the flooded shaft.

Greenhouses are or were heated in the Susquehanna Valley by gas rising through the measures and through the glacial drift to the surface. In at least one point in a coal field in Scotland, gas escaping from the coal measures is being used for greenhouse heating, according to Major Lloyd George speaking in the Commons (*Iron & Coal Trades Review*, Dec. 17, 1943). But surely it is not necessary to assert that most rocks are pervious and continue to be unless their interstices are filled by solids, liquids or gases which are so circumstanced that they cannot escape. That is a matter of common knowledge.

In the Johnstown region of Pennsylvania, the heavy falls of rock that occur suddenly and close headings were ascribed by Prof. Lansberg, then of Pennsylvania State College, to the expansion of a shale measure when wetted. But how did it get wet? It fell in places where the roof sweat could never have been competent for such wetting, especially as the shale that fell was located well above the coal seam. So the natural assumption is that the moisture came from a descent of ground water, but why had not the rock expanded before the mining started beneath it? Why did the rock fail to fall in virgin workings some lengthy time after headings were driven under it? Clearly it was dry before being approached by the heading and became wet when the headings were driven below it and gave something—probably some gas—an opportunity to escape and thus let the water enter.

Why Track Is Used As Electrical Return

Use of a copper return to connect all machines with the generator that provides them with current has been advocated by many as a means of affording greater safety, and the British rule which requires such a return is regarded as evidence of its inherent desirability, but the British have lighter rails than we have and have no trolley haulage requiring bonding. In consequence, unless they provide some other means specifically introduced for that purpose they would have to bond their rails to act as a return or they would have to try to satisfy their needs with the entirely inadequate device of connecting the machine with a large metal plate buried in the floor.

In any event, in this country we have the track, and it is bonded adequately or should be. It would be childish not to take advantage of that fact even if it seems that the return thus provided is inadequate, as it often is. The drop in voltage in the return should be no greater than the drop in the feeders; too often there is an excessive drop in both and in some mines the track return is supplemented by a direct wire return that is more dependable than the track and which, being cross-bonded thereto, makes the track a more reliable return.

Bond testers should be used on all tracks at intervals both for safety and efficiency, but, where they are not used, the inadequacy of the bonding if the roadbed is wet will manifest itself by dryness where the bonds are or should be, because in arcing over the gap much energy that should have been used in driving the machinery will be converted into useless and hazardous heat. This heat evaporates the water and may fire the coal.

Shuttle-Car Accident Fatal to Driver

A hazard that may easily be overlooked took the life of a driver at the Industrial mine, Rocky Mountain Fuel Co., Superior, Colo. The control of a shuttle car became defective, and the driver, Joseph Ambrose, placed the car in a crosscut and sent for the electrician, but before the repairs were completed the electrician had to leave to repair another car.

Ambrose ate his lunch and decided he would finish the work himself. After repairing a short in the wires of the operating switch, he turned on the current, and the car shot forward so quickly that he was caught between car and rib. For several years Ambrose had been in the habit of repairing the shuttle cars which he operated.

Will Infusion Cure Dust Suspensions?

Infusion, or the pumping of water into boreholes under pressure, up to 280 lb. per square inch, to break down the undercut (or overcut) coal and to suppress coal dust, gains favor in Great Britain. In 10 min. at one mine a percolation of water was observed 20 ft. on either side of the bore holes and, in another 10 min., the water evidently expelled a quantity of methane. One authority hopes that perhaps only the return, on which no men travel, need be rockdusted. Thus, no one then could claim that the mine air has been so contaminated with dust as to create a silicotic condition of the mine workers.

Of course, the cutting of coal must be accompanied by effective sprinkling, the coal on the mine cars must be sprayed before it leaves for the tipple, and it must not be rattled to the floor to be broken up on the roadway, but if any coal should fall, despite this care, it must be cleaned up promptly. Whitewashing will then be possible and visibility will be increased. (Incidentally it may be interjected that the roof and the sides then will be protected from air, and air percolation through pillars will be reduced.)

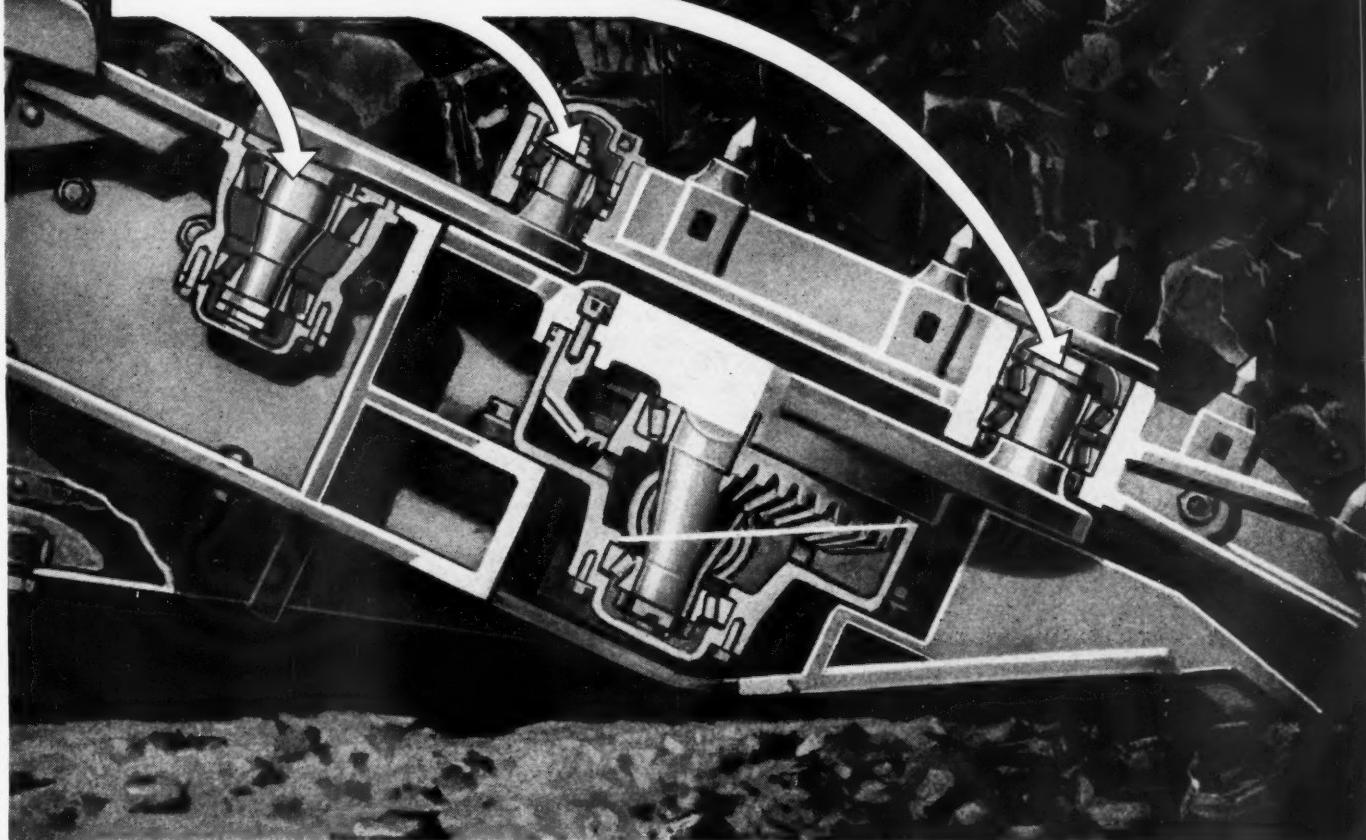
Perhaps, this will be the answer to two perplexing problems—explosions and silicosis—but it seems better suited to longwall in mines at depth than to room-and-pillar work in shallower mines, for longwall aids in opening up the coal for infusion and then helps to bring it down when the pressure is applied.

These loader
bearings are subject
to constant vibration
and shocks

HOW TO SOLVE

Operating Problems

with *Correct
Lubrication*



Get a shock-proof grease here!

IF THERE'S ANY PLACE in coal-mine equipment that has to take it, THIS IS IT. Here at the gathering end of the coal loader, bearings are subject to constant vibration—frequent shock loads—damp surroundings.

Hence, the grease used to pack these bearings is of vital importance to prevent breakdowns, loss of production time, and costly repairs. It must maintain a strong lubricating film under the continuous vibration, and in some mines it

must resist the washing effect of water.

Here, as everywhere else in your mine, Socony-Vacuum provides the correct lubricant for the job. It's Gargoyle AA Grease, specifically designed to stand up under constant vibrations and meet water conditions.

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STATE-BOARD QUESTIONS

Mine Foremen, State of Alabama*

Why Fires Occur

Q.—What are the principal causes of mine fires?

A.—Open lights, smoking, electrical leakage, electric short circuits, ineffective bonding, heating of electric equipment, blasting (especially with black powder) and spontaneous combustion. Some of these immediate causes first ignite methane, which ignition in turn makes the coal burn or burn with more vigor. Other causes are oil leakages and presence of grease, which oil and grease may be ignited by electric discharge or matches; ignition of oil in oil switches and transformers, ignition of hay or straw in stables and in transportation of this material from the surface to the stable, and ignition of curtains.

In deep mines where rubbish and even paper dries, such bad housecleaning may be a cause of mine fires. Mines have been fired by garbage dumped in cave holes and fired to incinerate the mass. Children often set fire to collections of leaves, timber and garbage merely to see the blaze, so cave holes are a distinct menace to mine operations.

* Continued from January, 1944, *Coal Age*, p. 76.

Bone coal thrown into cave holes may catch fire and thus ignite a coal seam (see also *Coal Age*, October, 1943, p. 68).

How to Control Fires

Q.—What are the usual methods of controlling or extinguishing mine fires?

A.—1. Digging them out, if small. On the surface, a mechanical excavator may be used. 2. Direct attack with water, chemicals, rock dust or sand. Some chemical methods are unsafe but the soda-acid extinguishers which develop carbon dioxide are safe in fighting fires in coal, but not in extinguishing fires where electric current is present, as the water projected conducts electricity. Water forms hydrogen and carbon monoxide as the result of the water-gas reaction, though some hydrogen may be formed by the direct action of heat on the fire. Hydrogen and carbon monoxide are both explosive, especially the first, and carbon monoxide is extremely poisonous. 3. Inclosing the affected area with tight seals to keep out air. 4. Flooding the affected area. 5. Flushing the affected area with silt. Other means will be described and discussed in a future issue of the Foremen's Forum.

planes or, as it is commonly stated, "on the butts," and rooms are driven at right angles to the main, or face, cleavage planes or, in other words, "on the faces."

[Coal tends to break into rectangular blocks with bedding planes on top and bottom, with faces on fore and aft and butts at either end (see illustration). There are two vertical planes of cleavage at right angles to each other along which the coal is broken:

[(1) A face cleavage which is quite generally so continuous as to reach from one side of the room to the other and even further. The coal breaks off easily along this vertical plane if it is not already broken in this manner. This cleavage plane often is stained by the action of water and oxygen. If the coal is mined up to and at right angles to this plane, less powder or explosive is needed to bring the coal down, less damage is done to the coal when it is brought down, and an explosion is less likely.

[(2) A butt cleavage at right angles to the face cleavage but less marked and less continuous and perhaps not present before mining.

In consequence, the room headings are driven "on the butts" (at right angles to the butt cleavage) and the rooms are driven "on the face" (at right angles to the face cleavage). The headings on the butts—the room headings—are termed "butt headings," and the headings driven parallel to the rooms are termed "face headings," because they are driven on the

Mine Foremen, West Virginia†

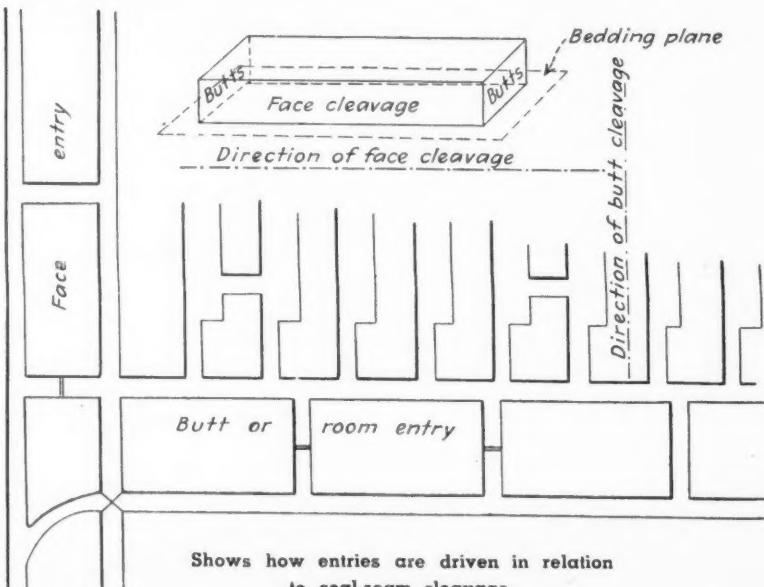
The following questions have been selected from those included in "The Mine Foreman's Guide, 1942," used as the basis for examinations in West Virginia. The answers given in the guide, which normally are quite brief, have been supplemented by comments and data, which the editors of *COAL AGE* hope will be of assistance to those interested in these subjects. The numbers given the questions in the guide follow each in parentheses thus (Ventilation, 1942, 128, etc.).

Using Faces and Butts

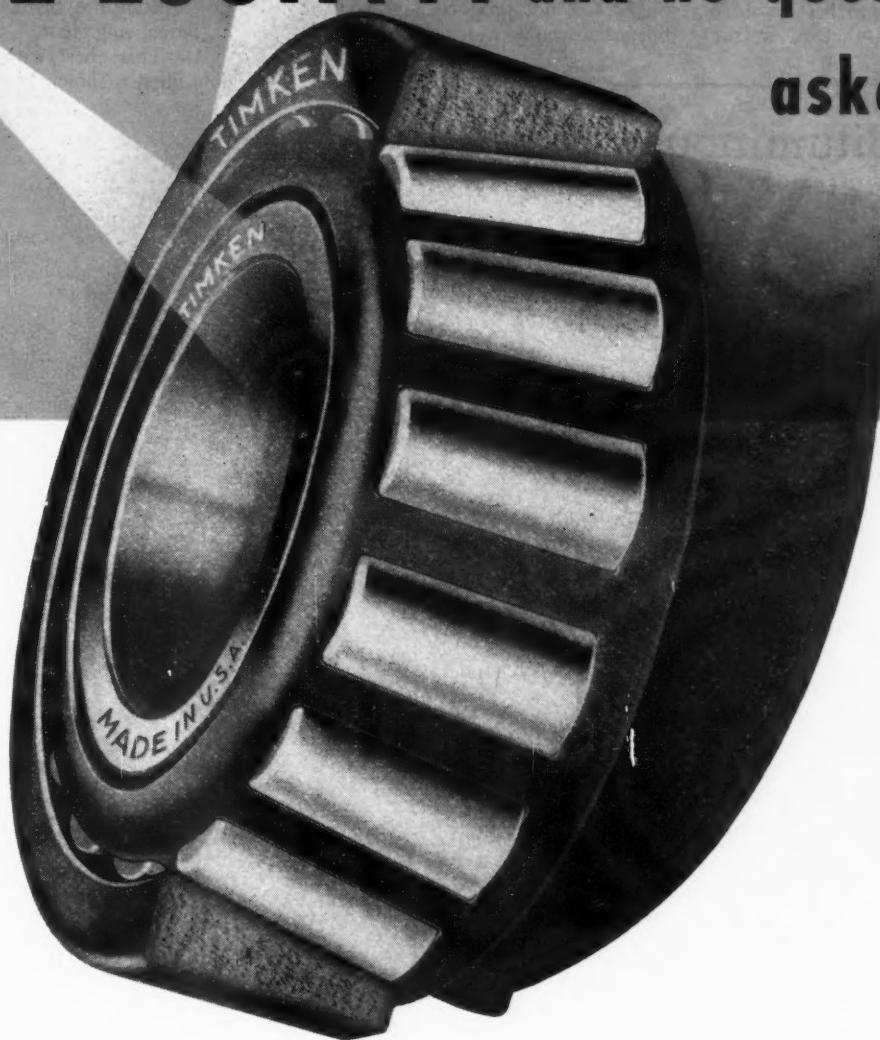
Q.—What is the usual relation between cleavage planes in the coal and the direction in which entries and rooms are driven (General Mining Practice, 1942, 15).

A.—Usually the room entries are driven parallel with the main, or face, cleavage

† Continued from September, 1943, *Coal Age*, p. 82.



ONE LOOK . . . and no questions asked!



WHEN buying mining equipment of any kind containing tapered roller bearings—cars, locomotives, conveyors, hoists—insist on seeing a sample of the bearings used and look for the trade-mark "TIMKEN" stamped on both *cup* and *cone*. If you see it you'll know exactly what you're getting.

When selling Timken Bearing Equipped min-

ing machinery point out this trade-mark to the prospective buyer. Your selling time and cost—as far as the bearings are concerned—will end right there. One look—and no questions asked; such questions as: "Who makes them?" "Are they correctly designed?" "Has the bearing manufacturer had specialized experience in applying them to this kind of equipment?"

THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

face. The face headings are rough, showing the short butt fractures, and the butt headings are smooth, showing the effect of the long straight face cleavage.

[As there are only two to eight butt headings to dozens and dozens of rooms and as the rooms are wide and much more coal is obtained from a room than from a heading, it is found best to drive the rooms on the face—that is, in the

direction which will result in the greatest tonnage of large-size coal, or lump—and to drive the room headings in the other direction regardless of the size of the coal obtained thereby. The rooms produce a large proportion of the coarse coal and the headings nearly all the slack. Where headings are driven on the face, they usually will not produce large coal unless they are driven as wide as rooms.]

First Aid Instruction, U. S. Bureau of Mines", p. 138).

For burns of arm, remove clothing from burned surfaces, apply picric-acid gauze and cover with an extra-wide cravat bandage; place the center of bandage on the arm and draw the ends around the arm several times and tie. (2 percent)

Q.—Fill in the blank spaces on the accompanying chart.

A.—This chart with the blank spaces duly filled is shown in the table below.

(6 percent)

Pa. Bituminous Firebosses*

Q.—How would you render first aid to a man suffering from burns of face and arms?

A.—Send for a doctor, but treat patient immediately for shock and apply picric-acid gauze, making sure that the gauze is placed between raw surfaces of ears and head, if any. Cover gauze with two triangular bandages and a cravat bandage as follows:

Lay the base of the triangular bandage over the top of the head a little back of its center, and let the rest of the bandage hang down over the face so that its apex will fall in front of the chin. Make the two ends of the base of the bandage cross back of the head below the bony prominence; then pass them around the neck under the chin, tying them together loosely so as to hold the apex of the bandage in place against the Adam's apple, or thyroid cartilage, of the neck.

Lay the center of the base of the second triangular bandage also over the top of the head but somewhat in front of its center, the rest of this bandage being allowed to fall over the back of the head until its apex rests on the nape of the neck. Carry the two ends of the base of the bandage under the chin, cross them at the Adam's apple, pass them around the neck and tie them loosely at the back over the apex of this same second bandage. Place the center of a cravat bandage under the chin, pass the bandage around the neck, crossing the ends at the back of the neck and tying them together in front (see illustration). If head and face only are burned, fold the two apexes up and insert them under the cravat bandage. Cut opening in bandage for nose (see "Manual of

* Continued from January, 1944, *Coal Age*, p. 76.

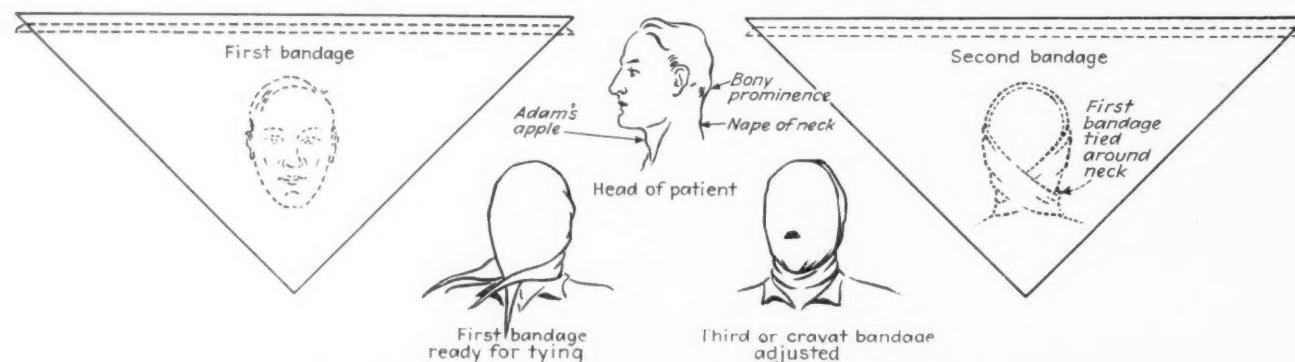
	MINE GASES †				
	Methane	Carbon Monoxide	Hydrogen Sulphide	Carbon Dioxide	Nitrogen
Chemical symbol	CH ₄	CO	H ₂ S	CO ₂	N ₂
Specific gravity†	0.5543	0.9672	1.1898	1.5282	0.9674
Is it combustible?	Yes	Yes	Yes	No	No
Does it support combustion?	No	No	No	No	No
Is it poisonous?	No	Yes extremely so	Yes extremely so	No	No
How is it detected?	Flame safety lamps; chemical analysis; special detecting apparatus.	Canaries; chemical analysis; special detecting apparatus.	Odor, chemical analysis.	Chemical analysis and action on flame of lamp.	Chemical analysis and action on flame of lamp.
Explosive range‡, percentage in air	5.0 to 15.0‡	12.5 to 74.0	4.3 to 46.0		
Ignition temperature, deg. Fahrenheit§	1100-1380 (1) 1202 (2) 999-1452 (3)	1100 (1) 1202 (2) 1191-1497 (3)	700 (1) 482 to 534 (2)		
Origin	Emission from coal, clay veins, etc., decomposition of vegetal matter under water.	Incomplete combustion, mine fires, explosions, blasting, reduction of carbon dioxide.	Bacteria ingesting the oxygen of iron or other sulphates.	Complete combustion. Small quantity in natural air.	Native to atmosphere. Increased in percentage by loss of oxygen in air.
What is its effect on life?	Will suffocate if breathed in high concentrations. Otherwise without effect.	0.10 percent in atmosphere in which man is walking will completely disable him in one hour.	0.07 percent will cause death in one hour.	Will suffocate if breathed in high concentrations. All gases but oxygen will do this, but some gases poison long before they suffocate.	

† Specific gravities and explosive ranges from U. S. Bur. of Mines, I. C. 6983, 1938.

‡ Figures for methane are wider than generally stated and probably involve slow inflammations with the source of heat underneath the mixture being burned. The examiners give 5.5 to 14.5 percent as limits.

§ (1) Figures given by examiners. (2) Figures given by G. W. Jones and G. S. Scott, U. S. Bur. of Mines, R. I. 3468, 1939.

(3) Figures given by "Crosby-Fiske-Forster Handbook of Fire Protection." Ignition temperatures depend on size, shape and material of testing container and other factors. The handbook quoted suggests that the figures for these gases be taken as methane 999 deg.; carbon monoxide, 1204; and hydrogen sulphide, 500.



How to bandage face when burned.

Let's "dig" the carbon out of motors too!



Coal is a form of carbon precious to mining men—but they don't want carbon in their motorized equipment. Hard, black carbon is destructive and wasteful on rings, pistons, valves.

Macmillan RING-FREE Motor Oil removes carbon while the engine runs! The result is a cleaner, more thoroughly lubricated, sweeter running engine. And continued use of RING-FREE keeps carbon in check.

Furthermore, RING-FREE Motor Oil reduces friction fast! Internal engine friction is reduced to the extent that it's measurable in fuel savings as more power is delivered to the drive shaft. The fast penetrating quality, high film strength, high heat resistance and long cling to metal of Macmillan RING-FREE—contributing to reduction of friction—cuts down wear and repair. It pays to improve the performance and lengthen the life of all types of Diesel and gasoline engines with RING-FREE!

MACMILLAN PETROLEUM CORPORATION

50 W. 50th Street, New York 20 • 624 S. Michigan Avenue, Chicago 5 • 530 W. 6th Street, Los Angeles 14
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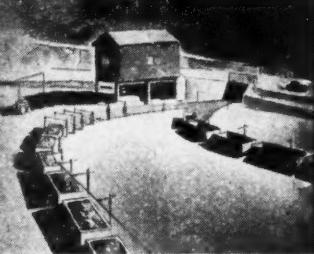
Quoting the MORRIS COAL & MINING COMPANY, Morris, Ill.: "...a Diesel Ten-Yard Drag Line... was causing expensive delays because of carbon and sludge conditions and stuck rings...and we decided to experiment with RING-FREE Motor Oil.

"The following eleven months, this Diesel operated continuously, day and night without one single shutdown for motor repairs. At the end of eleven months the motor was torn down and inspected. This revealed...no sticky rings, hard carbon, or sludge. Naturally with that kind of performance we have continued to use RING-FREE and have had no costly delays for mechanical repairs."

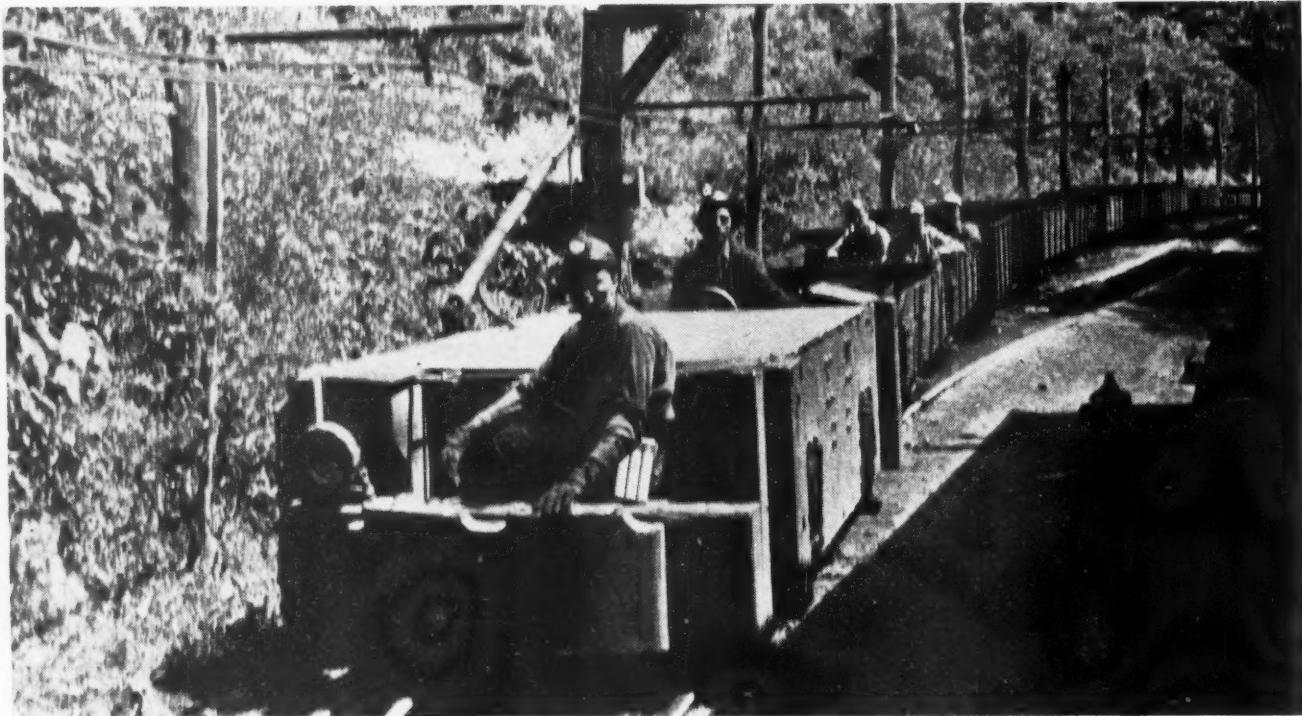
**MACMILLAN
RING-FREE
MOTOR OIL**

REDUCES WEAR BY REDUCING FRICTION

TIMELY OPERATING IDEAS



Change to Shoes Proves Successful



Heading in with the 18-tonner. Because the locomotive has a shoe collector instead of a wheel, officials riding in the second car will be able to see roof and ribs instead of a blinding series of arc flashes.

ON EVERY LOCOMOTIVE from the 6-ton cable-reel gathering units to the 18-ton main haulers, shoe collectors have been installed to replace trolley wheels at the Eunice (W. Va.) operation of the Princess Dorothy Coal Co. With this complete change-over and with the trolley wires kept in good condition, sparking is rare, thus saving considerable maintenance cost of collectors, reducing trolley-wire wear and making operation safer and more pleasant for motor crews and riders of man-trips.

The argument that back-poling can't be done with shoes has been disproved at the Eunice operation. Back-poling, in the few instances where reversing the pole would be impracticable, is done with entire success. The change was made at the mines in one sweep so there would be no arguments and so as to eliminate all wheel-sparking which would keep trolley wires from working down to a smooth surface. All of the shoes are Ohio Brass Type L.

At the beginning the wires were given a

treatment with burnishing compound purchased from the Ohio Brass Co. Since that they have been lubricated once a month with heavy oil. For the most part the wires are No. 9 Section 400,000-cir.mil size. Only that size has been purchased by the Princess Dorothy Coal Co. since it was

organized in 1938 to take over the C. & O. mines at Eunice.

All feeder cables in the mines are 500,000-cir.mil. The close-up snapshot shows the shoe of an 18-ton locomotive on a No. 9 section 400,000-cir.mil wire tied to a 500,000-cir.mil feeder.

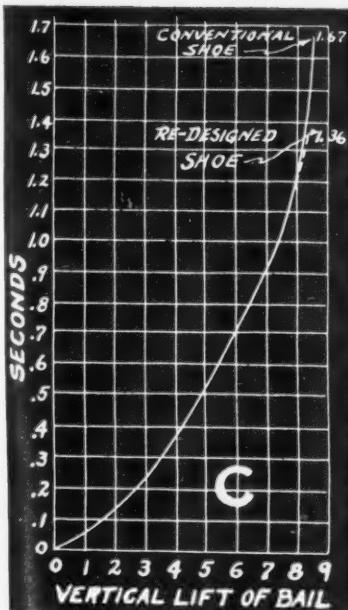
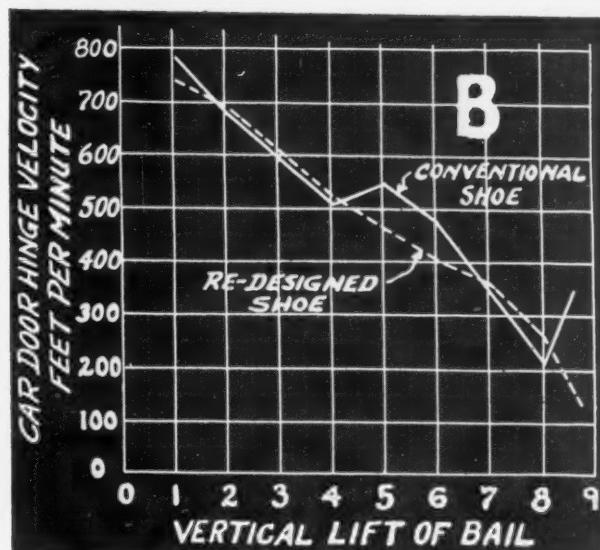


Sparkless current collection.

MORE HOISTS PER HOUR with HOLMES CAGES and DUMP SHOES



In designing Holmes all-steel cages all excess weight has been eliminated and accurate consideration is given to the proper distribution of the load, so that side sheets are relieved of excessive strains and the weight is transmitted directly to the lower bail members. They are fabricated to close tolerance for smooth, rapid operation.



Each cage design must be taken individually and its dumping cycle calculated for a shoe to give uniform deceleration. On Chart B we have plotted the dumping cycle for a large hoist making an average of more than four dumps per minute. For convenience, a point located at the car door hinge was selected and timed from the point of contact of dump roller with the shoe until the cage platform had been inclined to 45 degrees. A solid line traces the path of this point in feet per minute operating on a conventional type of shoe and indicates most irregular deceleration with a velocity of 320 feet per minute at full dump. In spite of a spring cushioned hook, caved-in doors and mishooks were not uncommon in the operation.

Smoothing out the cycle by redesigning the shoe to fit cage and speeds, the velocity dropped uniformly to 140 feet per minute, as indicated by the dotted line. After this change was made a rope life increase of 30% was noted, as well as reduced maintenance on cage and cars.

With the conventional shoe, spillage of coal is often a serious problem, being brought about by too abrupt a change in direction of movement and lack of uniformity in the movement.

In Chart C the vertical lift of the bail is plotted against time in seconds; and it will be noted that while smoothing out the cycle time was reduced 0.31 seconds, which adds about 4 hoists per hour.

Holmes dump shoes are tailor made of structural steel for each individual installation.

ROBERT HOLMES & BROS., Inc.
DANVILLE, ILLINOIS

Designers and Fabricators of Mining Equipment for Over 70 Years

Carrying Drill on Bar Is Safer



Stowed for tramming to the next place.

SAFER HANDLING and less work are the advantages of carrying electric coal drills on the cutter bars of arcweld machines, according to officials in Powhatan mine, in which the accompanying illustration was made. In this operation of the Powhatan Mining Co., Powhatan Point, Ohio, the drills are Jeffrey A6 and the mounted cutters are 29U of the same make.

The hooks were forged from 1-in. stock and besides the drill they carry the post and auger. Formerly the drill was transported on top of the water box with which the machine is equipped for allaying dust while cutting. To put the drill on the water box meant a higher lift and there was some chance of its sliding off. Furthermore, hanging the drill on the cutter bar reduces the carry by about 25 ft. when unloading at the face.

Separate Suggestion Boxes Better Than One

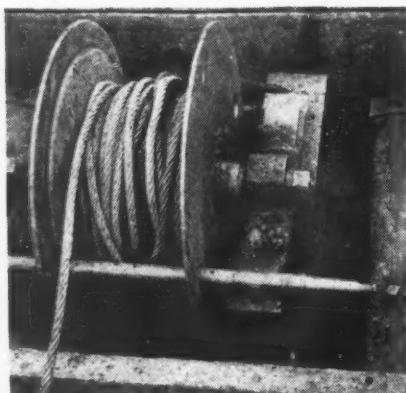
WORKMEN are in a position to see numerous deficiencies in the details of mine operation and think of many workable solutions. But without encouragement from the management most of these good ideas go to waste even though many of them may be of direct benefit to the workman himself. The suggestion-box method is appreciated by thinking men and has proved a considerable benefit, especially at this time when every good American is willing to extend himself to increase production of a material or commodity that furthers the war effort.

Instead of just one box, "Suggestions," the method is given point at the Powhatan mine (Powhatan Point, Ohio) by display of two boxes, one marked "Suggestions for Production" and the other "Suggestions for Safety." These boxes are fastened to the wall in the entrance to the bathhouse. Nearby is a small high table convenient for brief writing.



Reminders of the appreciation and need.

Safety Rope on Supply Slope Carried on Reel Car



WHEN A TRIP of supply cars is being pulled up a slope, a degree of safety from broken or uncoupled car hitchings can be had by the common method of a pointed drag on the last car and that arrangement will act also in case of a broken rope. But, when the trip is let down, the drag, of course, is not applicable. One alternative protection against coupling failures while traveling either up or down is an extra wire rope extending through or over the trip and attached to the bumper of the last car. The rope-over-top method, but arranged

Slack pulled out of the safety rope and locked.

for quick adjustment to any length of trip, has been used for several years at Powhatan mine of the Powhatan Mining Co., Powhatan Point, Ohio.

Referring to the illustration, a car of special construction is kept hitched to the rope and in the upper end of this car is a reel to accommodate the safety rope which is placed over top of the cars. After the end of this rope has been attached to the inby end of the last car the reel is tightened by hand and locked in position by a bar through holes in the flanges. The anchorage of the reel to the hitching of the car was designed with an extra large factor of safety.

Free Enterprise

... INCENTIVES AND TAXATION



There are three principal ways of making a living:

1. Getting on someone's payroll
2. Lending one's savings to business enterprises
3. Starting, or helping to start, a business enterprise

About three out of four of us fall in the first group—we are **job-holders**. Millions of us get some income, large or small, by lending our savings—directly or through such channels as insurance companies. We are suppliers of **loan-capital**. About one out of four of us has his own business enterprise, and several millions of us are part owners of business enterprises. Those of us who go into business for ourselves and those of us who are part owners of enterprises are **job-givers**.

The amount of employment in a community depends, in the main, on the number of persons who attempt to make their living, or part of their living, by giving jobs to others, rather than by getting on someone's payroll. A community seriously desiring a high level of employment

and a high standard of living will strive to make job-giving attractive and to encourage a large part of its population to be job-givers rather than merely job-holders.

The number of men who attempt to make their living in whole or in part by starting new businesses or by expanding old ones depends upon the outlook for profits. When the outlook for profits improves, thousands of new jobs open up and thousands of men go to work; and, as men go to work, the farmer and everybody else benefits. When the prospect for profits becomes darker, the demand for labor, capital, and raw materials drops. It may be roughly estimated that an improvement in the prospect for profits of one billion dollars raises the demand for labor by anywhere from two billion dollars to five billion dollars.

One of the principal determinants of the outlook for profits is the amount and the nature of taxes. After the war, the Federal government will need to raise each year about twenty billion dollars in taxes—three times the amount required before the war, and six times the amount re-

quired in the Twenties. In the Twenties, the tax needs of the Federal government were roughly twice as large as corporate profits in a good year. After the war, Federal revenue needs will be roughly three times corporate profits in a good year. Obviously, it will be much more difficult, after the war, for the government to meet its needs *without discouraging enterprise*, and therefore without diminishing the number of jobs, than it was before the war. Far more than ever before, it will be necessary for the government in developing a tax program to take account of the effect of taxes upon employment and the standard of living. This means that it will be important for each and every citizen to give attention to these matters—because the policies of the government reflect, in the main, the thinking of the citizens.

Some taxes seriously discourage individuals and business firms from undertaking new and enlarged operations. Other taxes have little or no adverse effect on investments. Some taxes are a burden on consumption, affecting the sales of specific commodities, depending on the nature of the taxes. It is obvious that different kinds of taxes have different economic influences. *We must understand the forces that determine the level of employment and consider the tax*

program in relation to other measures designed to create more jobs.

What are the tests of a good tax system?

1. Taxes should be designed to encourage production and enterprise and to make it attractive for a large number of people to earn all or part of their living by giving jobs to others.
2. Taxation must be fair in principle and administration, with no discrimination between persons in similar circumstances.
3. Taxes should be apparent and not concealed, and should be levied, in the main, directly upon individuals so that each of us will know how much our government is costing him. A moderate income tax at the lower income levels will bring a greater awareness of responsibility than will heavy taxes on consumption which the taxpayer does not see because they are hidden in the prices he pays.
4. In the aggregate, taxes should be somewhat progressive.
5. The tax system should be coordinated with the broader objectives of monetary and fiscal policy.

6. Federal, state, and local tax policies should be integrated as to principles and objectives.

Judged by these standards, our present tax system is extremely unsatisfactory; in fact, it is actually damaging. It is a conglomeration of hidden and direct taxes and of conflicting taxing jurisdictions and policies, with no comprehensive economic motive. It is distorted to appease pressure groups and includes uneconomic punitive measures. It is full of needless complexities. It is a paradise for tax lawyers and a source of confusion and despair for the honest, enterprising business man. In fact, it would seem almost as if our tax laws had been written by some fifth columnist for the purpose of making private enterprise unworkable. We in America pretend to believe in the pioneer spirit, but no one would ever suspect it by looking at our tax system.

When the war is over, there must be a thorough reform of our entire tax system. Federal taxes can and should be reduced substantially; and, in the process of reduction, changes can more readily be introduced. At that time, steps can be taken to achieve some degree of coordination and unity of purpose among federal, state, and local taxing agencies. Taxes play too important a role in our total economic life to ignore the adverse consequences of unrelated and inconsistent policies

of different taxing jurisdictions.

The following reform measures are needed in federal taxation:

1. **Repeal of the excess profits tax at the earliest possible date after inflationary dangers subside. In the case of most enterprises, the excess profits tax destroys all incentive to do a larger volume of business than in 1939; it appropriates virtually all increase in profits above the level of 1939.**
2. **Coordinate corporation and individual income taxes so as to avoid double taxation and impediments to risk-taking. Preferably, corporation income taxes should be wholly eliminated. Otherwise, the corporation tax rates should be reduced to the lowest effective rate on personal incomes. Full credit should be given to stockholders for all corporate income taxes paid.**
3. **Encourage competition and particularly the formation of new enterprises by allowing new corporations generous tax exemptions for a period of five years. Extend the same principle to unincorporated concerns.**
4. **Encourage risk-taking (and hence job-**

- giving) through extending the loss carry-over to six years or more.
5. Provide for averaging incomes over a period of years in order to remove discrimination against those with irregular incomes and those who take risks of loss in business ventures.
 6. Rely upon the personal income tax as the main source of revenue, with broad coverage. The reduction in total taxes after the war should favor the elimination of excise taxes before reducing income taxes.
 7. Reduce the upper range of personal income tax rates to a maximum of perhaps fifty to sixty per cent so that risk-taking investments will be really attractive. Higher rates are punitive in character, yield small receipts, and throttle risk-taking.
 8. Encourage risk-taking by individuals in the higher brackets by making the surtax on incomes of \$20,000 a year or more half as much on income in the form of dividends as on income in the form of salaries or interest.
 9. Encourage risk-taking by individuals by permitting capital losses to be

- charged against general income provided the reduction of tax liability in any one year is not more than fifty per cent.
10. Repeal the tax-exempt privilege for all *new* securities issued by all governmental jurisdictions.
 11. Eliminate excise taxes which place a disproportionate burden on persons with lower incomes so as to encourage greater consumption and provide an expanded market for our vast industrial capacity.
 12. Reform tax administration to simplify forms and procedures, to broaden the scope of enforcement, and to encourage the spirit of fairness.

With such reforms and continuing reappraisal of the tax program as it affects the economic situation, we can look toward taxation as an instrument of constructive influence in giving the fullest encouragement to free enterprise and in attaining continued prosperity.



President, McGraw-Hill Publishing Company, Inc.

They practice what they preach

Here in the oil fields, operators talk and produce in terms of thousands of barrels. But when it comes to consumption of these vital stores of petroleum—then these same men are just like any "A" book holder down to his last coupon.

This vigilance against waste is not just a war expediency. It began long before the hooked cross spread its tentacles over the world . . . and its beginning was marked by the introduction of Cummins Diesel Power in the oil fields because it was found to be "Faster and Cheaper than Steam."

Today, in every major producing area, Cummins Dependable Diesels are in the forefront of the petroleum industry's fight to achieve maximum production with maximum economy . . . not only economy in the consumption of fuels and lubricants, but also economy of time, materials and manpower.

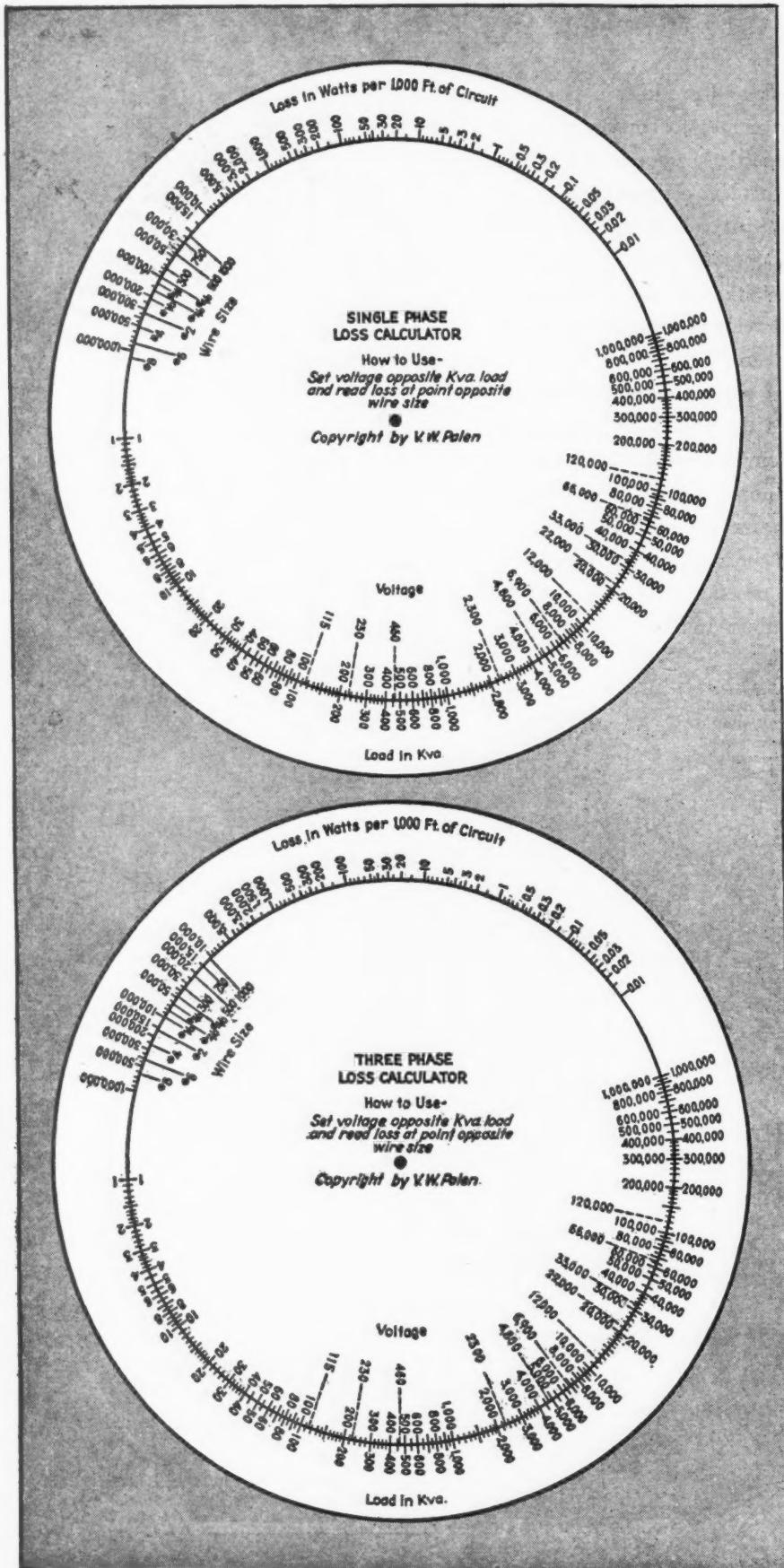
Here, truly, is a demonstration of conservation . . . here is an example of men in industry who *practice what they preach!*

CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the fourth in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. If you are operating Cummins Dependable Diesels, you can assure their most effective use by making doubly sure that they are maintained and serviced—regularly and efficiently. Ask your Cummins Dealer for details.



Calculator Solves I^2R Quickly



"HERE'S A DEVICE which determines I^2R loss in wire circuits with a flick of the finger," writer V. W. Palen, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. "Cut along the circles to make two disks and two rings. Using rubber cement, mount the disks on separate pieces of cardboard. On the reverse sides of a third piece of cardboard mount the two rings. Now punch the center holes and insert a small brass bolt to hold the disks in place. Washers will help prevent wear and tear on the paper. Tighten the bolt to provide the proper pressure on the disks. They should hold their settings, yet turn easily. A drop of solder applied to the nut will make the assembly permanent."

"The calculator solves the single-phase equation

$$\left[\frac{Kva}{Kv} \right]^2 \times 2R = W$$

where R is the resistance of 1,000 ft. of single conductor and W is watts per 1,000 ft. of circuit. The three-phase equation handled by the device is equivalent to the single-phase relationship divided by two. Copper conductor is, of course, the basis of design—stranded in sizes No. 2 and larger."

Short Cuts

Industrial leaders frequently give their individual formulas for success. And almost invariably their answers, when boiled down to a few words, resolve into the delegation of details. They do everything the easiest way. When you meet a problem and seek a solution it's mighty handy to be able to put your hand on a worked-out solution. These pages are designed to supply such a time-saving fund. If you have any solutions to mechanical, electrical, operating or safety problems, here is the place for them. Send them in, accompanied by sketch or photograph if it will help to make them clearer. Acceptable ideas are paid for at a minimum of \$5 each on publication.



A SYMBOL OF COOPERATION

To the men and women of Thermoid, the Thermoid seal is more than just a trade mark and a product identification. It is a symbol of individual responsibility among all company employees: management, engineering, production and sales.

This concept of the Thermoid seal produces cooperation among employees. Every Thermoid employee realizes that his own business welfare directly depends upon the approval and acceptance of Thermoid Products by the user...that men and management who manufacture inferior merchandise also manufacture the elements of their individual failure.

The protection of this Thermoid seal is therefore recognized as the personal duty of every member of the Thermoid group. Uniformity in product manufacture, meticulous inspection, prompt and personalized attention to customers, and all of

the other things that have made for consistent Thermoid progress are in large measure traceable to this concept of the Thermoid seal.

No matter what the uncertainties ahead Thermoid will continue to make the finest industrial products possible. 1944 finds Thermoid with the largest personnel and facilities in its history. We are confidently hopeful that during this year, we will have the opportunity of further demonstrating the cooperation symbolized in the Thermoid seal—the cooperation that has caused Thermoid customers to say:—"It's good business to do business with Thermoid."

THE THERMOID LINE INCLUDES: Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products • Molded Hard Rubber and Plastic Products.

Thermoid
Rubber

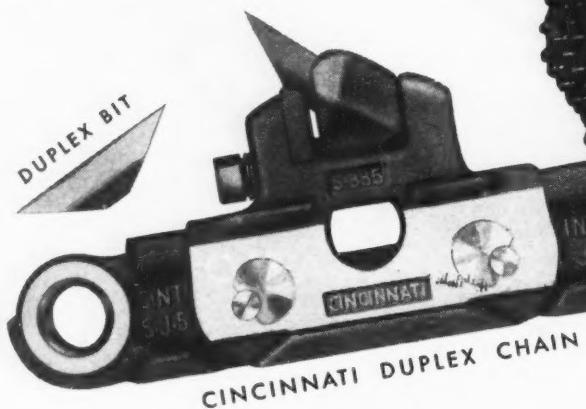
DIVISION OF THERMOID CO.
TRENTON, NEW JERSEY

It's Good Business to do Business with Thermoid

COAL

KEEPS BIG SHELLS HAMMERING ENEMY

Without coal, war production would stop over night. Hundreds of thousands of tons of coal are used in turning out large shells that blast away at the enemy.



Official U. S. Army Photo

Shells after going through nosing press . . . Gadsden Ordnance Plant.

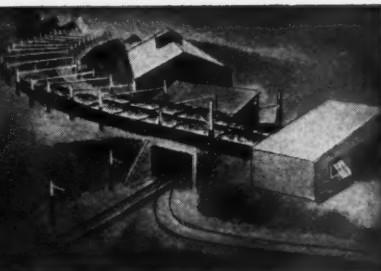
CINCINNATI COAL CUTTING EQUIPMENT INCREASES PRODUCTION AT LOWER PER TON COST

While coal cutting equipment "That Can Take It" is most important today, Cincinnati Chains, Bits and Cutter Bars give you a lower cutting cost per ton in addition. The Cincinnati Mine Machinery Company has for years specialized in turning out precision coal cutting equipment made of high grade alloy steel . . . heat treated and drop forged. The Cincinnati Duplex Chain is so engineered as to place the greatest wear and tear on inexpensive, easily replaceable parts so that maintenance is reduced to a minimum. The Duplex double-ended reversible bit "Tops Them All" for long-life cutting performance with bit setting time greatly reduced. May we serve you?

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO

COAL AGE NEWS ROUND-UP



Tight Supply Stiffens Distribution Controls

Shift to Bituminous Coal for Domestic Use Urged to Alleviate Hard-Coal Shortage in the East—Diversion and Directives Used to Ease Situation

Late Developments—OPA raises ceilings on all byproduct and retort coke in the East 50c. per ton Jan. 22.

Reg. No. 12, Jan. 27, applies emergency retail distribution regulations to domestic coke.

Reg. No. 13, Jan. 27, directs certain producers in District 8 to ship specified proportions of lump and double-screened output to critical shortage areas in the Southeast. Certain other producers were directed to withhold a proportion of their domestic-size tonnage for emergency direction to same area. Household stoker coal excluded.

OPA raises mine prices of coal 3c. per ton in western Kentucky Jan. 28.

Anthracite mines in government control directed to work on Sunday during February in order issued Jan. 29. Double time to be paid. OPA, Jan. 31, grants price increase of 45c. per ton for the same period.

OPA, under four specified conditions, authorizes higher ceilings for residual sizes produced by double screening to aid in the production of stoker coal; authorization effective Jan. 29.

WITH the coal supply situation growing more critical daily in New York and Philadelphia, as well as throughout the ten northeastern states and the District of Columbia, January was marked by a number of emergency measures to meet the exigencies. These included prohibition of shipments of anthracite west of the Ohio-Pennsylvania line, a directive to switch to the use of bituminous where possible, substitution of soft coal for hard by the Army for half its requirements, setting up of a reserve of 8,000 tons of anthracite in New York City to meet listless cases, and directives ordering shipments to areas facing acute shortages.

In announcing the proposed shift by the Army to the use of bituminous coal for 50 percent of its requirements, Solid Fuels Administrator Ickes said, Dec. 27, that already about 20,000 tons of anthracite had been cut from Army contracts for the next three months, adding that estimates indicated that Army use

in sizes of pea and larger would be reduced by about 150,000 tons.

Shipments of anthracite to points west of the Ohio-Pennsylvania line were prohibited between Jan. 1 and April 1 in an order issued Dec. 30 by Mr. Ickes. These supplies, totaling about 100,000 tons a month, are to be diverted to the hard-pressed East Coast area. At the same time it was announced that there were to be additional daily shipments of 4,000 tons of low-volatile bituminous coal to the New York metropolitan area.

To take care of the needs of householders unable to use bituminous coal, an order also was issued freezing for distribution to such consumers 8,000 tons of anthracite on hand or in transit to New York City. While SFA relied on the voluntary cooperation of dealers to bring about the shift from anthracite to bituminous where possible, there was a plain implication that a directive might be issued requiring such a change if the voluntary program failed of its objective. Manpower, not only at the mines but elsewhere, was a major factor in the situation. Part of New York's distress reflected lack of sufficient men to unload railroad cars, especially at the Jersey City coal piers opposite New York, and shortage of delivery labor within the city itself.

VITAL TOO

Paper is just as much a war material as steel and rubber. Like steel and rubber, it finds direct use on the battle front, in the manufacture of war material and in essential civilian activities at home. The supply is short. The need for conservation is great. Save paper to promote the war effort. Use as little as possible and make that little go as far as possible. And when paper is used as much as possible, see that it is salvaged for other war service.

Meantime, the situation in Philadelphia became so acute that Mr. Ickes ordered a 4 percent increase in hard-coal shipments Jan. 4 to relieve hardship there. The order was in response to a telegraphed appeal for federal assistance from Mayor Bernard Samuel. The Solid Fuels Administrator disclosed that 100 cars of high-volatile bituminous coal also had been diverted to Philadelphia to take care of critical needs.

As the situation got tighter, Secretary Ickes was reported Jan. 13 as exploring the possibility of Sunday operation of anthracite mines. Estimates of additional tonnage to be made available by the extra work day ranged as high as 250,000. The suggestion, as well as the order barring shipments west of Pennsylvania, elicited a storm of protest from the anthracite region. Labor spokesmen expressed doubt that the miners would work on Sunday after laboring six week days as called for in the schedule under government control of the mines. In any event, operators, distributors and labor leaders in the hard-coal region considered the reports of an anthracite crisis as somewhat exaggerated and expected it to blow over soon. They also branded the figures on tonnage that would result from working the mines on Sunday as an overestimate by about 50,000 tons.

Hard Coal Crippled?

It was asserted by some producers that the order limiting hard-coal shipments to the eastern states will curtail shipments just at a time when the industry was beginning to regain some of its midwestern markets lost through a similar order during the first World War.

That all possible tonnage of bituminous coal is being produced and put to use is indicated by the fact that one day's output of six captive mines of the Republic Steel Corp., which worked despite the steel strike late in December, was diverted to other vital industries when idle plants prevented unloading the coal at normally consuming steel mills. Five of the mines are in Pennsylvania and the other in Kentucky. Redistribution of the coal—total-

ing about 14,600 tons—was ordered by Deputy Coal Mines Administrator C. J. Potter.

Secretary Ickes announced Jan. 5 that emergency directives issued about that time had made over 35,000 tons of low-volatile bituminous coal available to dealers in nine eastern states critically short of fuel because of dearth of anthracite. The Administrator cautioned dealers that they "have a responsibility to their communities to accept and distribute such coal when it is offered to them to meet critical consumer needs. Consumers should not need to be urged to take willingly soft coal which will burn in their equipment. Even though it may involve the abandonment of prejudices and some changes in firing methods, soft coal will provide heat, which will prevent hardship. In wartime, a consumer who cannot get exactly what he wants must be ready to take the next usable product."

Emergency Order Issued

Among other directives issued by SFA to meet emergencies was one dated Dec. 31 ordering bituminous coal producers in District 8 to ship on the first three days of the week of Jan. 3 from their mines to their all-rail retail dealers in eight southeastern states from whom they had orders the entire production of all sizes covered by such orders. An order issued Jan. 14 directed producers in District 3 to ship to all-rail dealers in the northeastern states from whom they had orders the entire production of all sizes covered by such orders on the first two operating days of the week of Jan. 17.

Upon request of Deputy Administrator Potter, the Interstate Commerce Commission released Jan. 14 Service Order No. 177 directing the railroads to accept re-consignment or diversion orders from SFA or its authorized agents diverting coal to any person designated by the Administrator or his agents.

Commenting on the recent shipment of bituminous coal into anthracite-consuming territory, Secretary Ickes pointed out that there is a lag of from one to three weeks between the time substitute soft coal is ordered into the hard-coal consuming region and its actual arrival. For that reason, he said, dealers should take necessary steps to obtain a supply of bituminous coal before all anthracite available in their communities is exhausted.

To insure maximum equity in dividing the available supply of fuel, Mr. Ickes announced Jan. 10 that government control over the retail distribution of coal would be extended immediately to cover the domestic use of coke. Authority over domestic coke distribution was delegated to SFA in a directive issued by Donald M. Nelson, chairman of the War Production Board. Mr. Ickes added that in collaboration with WPB steps were being taken to arrange for the diversion of some of the coke available for domestic use in the East to supplement the inadequate supply of anthracite in critical areas in the northeastern states.

Aside from the emergency diversion orders, the major development in regulation of bituminous distribution in Janu-

ary was Amendment No. 2 to SFA Reg. No. 10, effective Jan. 15. The amendment further reduced the permissible maximum deliveries of bituminous coal to industrial consumers in various categories in various areas, conditioned by the size of their stockpiles. Its objective, according to SFA, is that "a larger share of the current mine output be made available for diversion to users distressed for lack of fuel."

The limitations of the amended regulation are compulsory upon all industrial consumers supplied by Appalachian and midwestern mines, except mines in Michigan and Iowa. The regulation allows any consumer to accept coal over and above the maximum amount he may order provided that the producer supplying him does not have sufficient unfilled emergency orders to take up his entire production. Retail dealers' orders are not affected by the limitations of the amended regulations, nor do they apply to orders for special purposes or metallurgical coal, bunker fuel orders of specified government agencies and orders from consumers requiring not more than a single carload per month.

Additional advisory committees set up by SFA in January included a Lake Dock Coal Advisory Committee and a Tidewater Coal Dock Advisory Committee to help with suggestions, information and advice on problems of equitable distribution of coal received at these docks.

Court Rules Against Portal-to-Portal Pay

In a decision on portal-to-portal pay Judge A. D. Barksdale ruled Jan. 25 in the Federal District Court at Lynchburg, Va., that the Fair Labor Standards Act of 1938 was not intended to force mine operators to pay underground employees for the time they consumed in traveling in mines to and from their places of work. The court said he could find nothing in the act which in-

dicated that it was the intent of Congress to make so radical a change in the wage structure of the coal industry as to require payments for underground travel time. A declaratory judgment was entered in favor of the Jewell Ridge Coal Corp., which brought the suit, against several locals and the international union of the United Mine Workers of America.

Spokesmen for the U.M.W. said it would appeal from the Virginia court decision. They added that Judge Barksdale's decision seemingly is in direct contravention of two other district court decisions and a Fifth Circuit Court of Appeals ruling that travel time must be considered work time in applying the Wage Hour law to iron-ore miners.

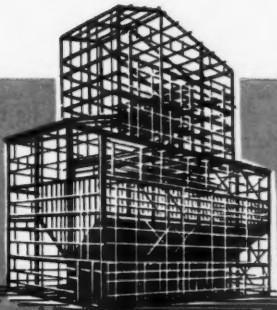
Arguments of counsel in the steel company portal-to-portal travel-time case were heard Jan. 14 and 15 by the U. S. Supreme Court. Nathan L. Miller, former governor of New York, and Borden Burr, representing the steel companies, held that it was not the intent of Congress to nullify long-established customs and standards arrived at through collective bargaining or to substitute for customs, traditions and conception of the industry variant judgments of juries and that the result of compelling portal-to-portal pay would be to cause, instead of prevent, unfair competition in commerce and to bring about a result wholly contrary to the purposes of the law. They asserted that the definition of work week must be left to the realm of collective bargaining, where Congress had obviously left it, having refrained from defining it and having refrained from providing for an administrative definition.

During his argument, Governor Miller declared that the contract now pending before the National War Labor Board in the bituminous coal case could not be sustained under the decision of the Circuit Court of Appeals in the ore case. He said that he felt approval of the Ickes-Lewis agreement resulted primarily "from the forceful personality of the distinguished Secretary of the Interior."

Col. Crampton Harris and Solicitor



One or two lumps, sir?



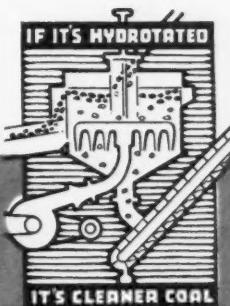
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General Charles Fahy, arguing for the union and the government, held that the question is one of fact and that contracts cannot exclude that which is actually work from the concept of work week as used in the statute. "In determining what constitutes employment or work within the meaning of the act," Mr. Fahy argued, "the significant inquiry is not whether the employee is engaged in so-called 'productive' labor but rather whether the employee is subject to the employer's direction and control and is engaged in services contributing or necessary to the performance of the job for which he was hired. The evidence in the record describing the underground descent and ascent in petitioners' mines establishes with forceful eloquence that this travel not only possesses all the elements of employment but also all of the characteristics of hard work."

In addition, the Solicitor General contended that "the petitioners' contention that 'face-to-face' custom has been established by collective bargaining agreements between petitioners and their employees is without foundation. . . . The record shows that, prior to the enactment of the FLSA, petitioners had not recognized any labor organization as the representative of their employees."

Anthracite Tracts Change Hands

Four anthracite tracts in Pennsylvania changed ownership during the last month. Greenough Coal Land Co., William H. Greenough president, has sold to the Alaska Coal Co. two large pieces of coal land in Zerbe and Mt. Carmel townships for \$251,000, according to deeds filed in the Register and Recorder's office at Sunbury. The Zerbe Township tract comprises 421 acres and that at Mt. Carmel Township is of 413 acres.

The old Alliance preparation plant at Kaska, Schuylkill County, with 719 acres and 64 perches of land of the Kaska tract in Blythe Township, with 43,648 acres of the Adam Stahl tract, was sold by Edith and John E. Jones and Isabel and Milet Butts, all of Pittston, to Ruth Fritz, of Wyoming, Luzerne County.

A tract comprising 2,092.5 acres, part of the Delano lands, situated partly in Delano and Mahanoy townships, was purchased by the Branchdale Coal Co., Middleport, from the Jones Coal Co.

Construction Starts On Texas Gas Line

Despite rumblings of dissatisfaction from Texas officials, construction started Jan. 2 on the \$50,000,000 natural-gas pipeline from Texas to West Virginia. Being built by the Tennessee Gas & Transmission Co. and underwritten by the Chicago Corp., the line is scheduled to carry by next autumn about 200,000,000 cu.ft. of natural gas daily from the gas fields of south Texas into the heart of the Appa-

lachian coal fields (*Coal Age*, December, 1943, p. 154).

The Tennessee company has stated that it will pay nearly 5c. per 1,000 cu.ft. for the gas that it takes out of Texas wells in an area where natural gas often is worthless. In early January it was selling in the Corpus Christi sector for around 1½c., and it was suspected that some of the opposition to the pipeline was stemming from gas suppliers with long-term contracts who do not wish the price of natural gas to rise. Price of the gas delivered to the eastern terminus of the line will be 30 to 40c. per 1,000 cu.ft.

Governor Stevenson, most outspoken opponent of the line, had hinted that he would ask a special session of the Texas Legislature to pass a stiff severance tax on natural gas leaving the State.

Early in January, debate also was under way as to the possibility of one or two new oil lines from Texas to the East being taken over as a substitute for construction of the new gas line.

Extends Rule On Minimum Prices

Permission to sell bituminous coal at minimum prices allowed under the former Guffey Coal Act where these minimums exceed OPA maximum prices has been extended from Dec. 31, 1943, to April 30, 1944, for all producers in Districts 8, 19 and 20 and to strip producers only in District 15, the Office of Price Administration announced Jan. 21. Geographical locations of the four districts affected are: No. 8, southern West Virginia and parts of Virginia, Kentucky, Tennessee and North Carolina; No. 15, Missouri, Kansas, northern Oklahoma and Texas; No. 19, Wyoming and part of Idaho; No. 20, Utah.

Barrackville Gets Added Area

The life of Barrackville No. 7 mine of the Industrial Collieries Corp., Barrackville, W. Va., will be prolonged indefinitely through the purchase of 1,413 acres of land, according to a company spokesman. The mine now is West Virginia's largest single producer. The tract, which was purchased by the parent company, the Bethlehem Steel Corp., was unofficially reported to have cost in the neighborhood of \$820,000.

Preparation Facilities

BUTLER CONSOLIDATED COAL Co., Wildwood, Pa.—Contract closed with McNally-Pittsburg Mfg. Corp., for McNally-Norton automatic unit washing system to treat 75 t.p.h. of 2x½-in. coal; plant now in operation.

CONSOLIDATED COAL Co., Herrin, Ill.—Contract closed with McNally-Pittsburg Mfg. Corp. for one McNally-Norton automatic unit washing system to treat 75 t.p.h. of 3x½-in. coal, dewatering, screening and

returning to existing loading equipment.

DEANGELIS COAL Co., Carbondale, Pa.—Contract closed with Wilmot Engineering Co. for one Type E Simplex jig to prepare broken and egg coal; feed capacity, 75 t.p.h.

MAUGER CONSTRUCTION Co., Pond River, Ky.—Contract closed with McNally-Pittsburg Mfg. Corp. for cleaning plant addition comprising two McNally-Norton automatic washers for 6x2- and 0x2-in. raw coal in compound circuit; capacity, 400 t.p.h.; also McNally-Carpenter dryers for centrifugally dewatering 0x½-in. washed coal; classifying, loading and mixing facilities for five sizes; new mine-run facilities to hand-pick 6-in. and rescreen 0x6- into 6x2- and 0x2-in. for washer feed; McNally-Pittsburg stoker-coal crushing equipment capable of reducing minus 3-in. coal to minus ¼-in. and loading to tracks; to be completed about June.

PANTHER RED ASH COAL CORP., Panther, W. Va.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap washer with vibrating screen and product chutes; capacity, 50 t.p.h. of 3x1½-in. coal.

RYON COAL Co., Pottsville, Pa.—Contract closed with Wilmot Engineering Co. for one Type D twin Simplex jig to prepare stove, nut and pea coal; feed capacity, 40 t.p.h.; also for one Type D Simplex jig for buckwheat No. 1 coal, feed capacity, 20 t.p.h.

SOONER COAL MINING Co., Oologah, Okla.—Contract closed with McNally-Pittsburg Mfg. Corp. for washery addition to existing plant to consist of one McNally-Norton automatic washer to clean 200 t.p.h. of 0x1½-in. coal, complete with water-clarification and dewatering equipment; to be completed about April 1.

WEST GULF COAL Co., Maben, W. Va.—Contract closed with Kanawha Mfg. Co. for five-track tipple including cross-over dump, hopper and feeder, shaker screens, lump and egg loading booms, two Allis-Chalmers vibrating screens, mixing conveyor, slack conveyor, rescreen conveyor; capacity, 250 t.p.h.

WILLIAMS STRIPPING Co., Schuylkill Haven, Pa.—Contract closed with Wilmot Engineering Co. for one type D Simplex jig to prepare nut coal; 20 t.p.h.

Move to Protect B.C. Coal Lands

In a move to protect the coal resources of the Peace River area, Premier John Hart and Lands Minister Wells Gray, of the British Columbia Government, announce that a reserve has been placed on the coal deposits of the Peace River country until regulations are devised to form a basis for wise development of these resources.

The action is designed to retain the coal resources of the province "for development on a basis whereby the public's interest will be fully protected in respect to royalties, fees and taxes and to prevent exploitation under abnormal conditions." An important feature is that it will prevent properties which show promising coal deposits being taken over and held out of development.

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Four Join Fight On Ohio River Tax

Kentucky's right to collect back State, county and school ad valorem taxes from out-of-State firms using the Ohio River, or operating coal, oil or other transportation lines on the Ohio past bordering Kentucky counties was challenged Jan. 11, when four companies filed petitions in the Franklin County Circuit Court. These petitions, all similar, were brought in answer to actions brought some weeks ago by Kentucky back tax collectors, who get a percentage of any sums recovered by enforcing tax demands.

The four companies are the Ohio River Co., a West Virginia corporation; the Island Creek Fuel & Transportation Co., incorporated in Maine; the Hatfield-Campbell Creek Coal Co., and its subsidiary, the Ohio & Kanawha Transportation Co., both Ohio corporations.

Attorneys have held that under the Virginia grant, which created Kentucky, it was provided that the Ohio River was always to be free to everyone for use as a transportation artery. The defendants contend that it is a navigable stream and is tax-free.

Fuels-Heating Course For Coal Dealers

School courses in fuels and heating sponsored by the University of Illinois and the Illinois Fuel Merchants Association began Jan. 3 and are being held once a week for twelve weeks in the following Illinois towns: Freeport, Waukegan, Downers Grove, Wheaton, Elgin, Quincy, Decatur, Ottawa, Joliet and Aurora. The entire course is free.

The purpose of the course is to present an educational program of practical information on fuels and heating for the benefit of those engaged in the coal and allied industries. Top notch coal men have accepted invitations to lecture and instruct on various subjects.

Being held on university standards—that is, hours of work basis—the course requires 48 hours, 36 of which are to be lecture and discussion and 12 laboratory work (inspection of heating plants, etc., by each individual student). There is only one instructor per session and there is no time limitation on the lecture. This is left to the discretion of the speaker, the remainder of the time being oral questions and answers, and students are encouraged to review the subjects outlined and be prepared to ask questions.

Subjects to be covered include: (1) present fuel and heating needs, basic factors that affect satisfactory heating and use of coal, and consumer psychology; (2) elementary principles of heating; (3) types of heating facilities—design, application and use: furnaces, boilers, stoves, fireplaces and heating accessories; (4) stokers—household, commercial and semi-industrial; (5) housing or building construction and its effect on heating results; (6) A-B-C's of combustion, draft, excess air,

etc., and draft regulators, chimneys and smokestacks; (7) characteristics of various coals; (8) stoker coal; (9) stoker-coal service problems; (10) trends in coal sizing, preparation and use; (11) trouble shooting, possibilities in fuel conservation, plant modernization and firing methods; (12) education of the fuel user and post-war activities.

Lehigh Navigation Sets Output Record

Establishing a new anthracite production record, the workers of the Lehigh Navigation Coal Co., in the Panther Creek Valley of Pennsylvania, produced one-third more coal in 1943 than in 1942, according to Evan Evans, vice-president and general manager. Total commercial production in 1943 was 4,092,820 tons, compared to 3,057,855 tons in 1942, an increase of 1,034,820 tons, or 33.84 percent. The best previous record in the history of the company for the same operations was 3,525,326 tons in 1917.

"This remarkable new record was made at a time when more and more men were leaving the company for the armed forces, and workers also were called upon to accomplish the utmost in the way of maintenance," Mr. Evans pointed out. "Every individual who contributed to this record is to be congratulated, not only for having helped to provide a vital war material but in demonstrating the real support that assures final victory."

The number of days worked by all three collieries—Lansford, Coaldale and Tamaqua—in 1943 average 272, compared with an average of 226 days worked in 1942, and increase of 20.35 percent.

Dawson Creek Mine In Production

Incorporated in December with 100 shares of no par value, the Hasler Creek Coal Co., Ltd., Dawson Creek, B. C., in the Peace River Block, has already started operations. Ten miles of road and eight temporary bridges have been constructed. Production has reached 35 tons a day, which is being increased as rapidly as possible. It is hoped as work progresses that aid for highway improvement and construction of two bridges over the Pine River will be obtained from the government.

Fire at Short Creek

Short Creek mine, Tennessee Coal, Iron & R.R. Co., Short Creek, Ala., a large new development which has been under way for some months, suffered damage Dec. 30 from fire to buildings, equipment and supplies estimated at \$100,000. The flames destroyed a shop building and part of its contents of mine machinery and general stores. Development work at the new mine, which is considered one of the company's potentially important producers, will not suffer much delay, it was reported.

Rail Lines Planned To Tap Coal Fields

New coal fields in eastern Kentucky are to be tapped by two railway extensions to be completed early in 1945 by the Chesapeake & Ohio Ry. and Louisville & Nashville Ry. at a cost of about \$7,000,000 and the Norfolk & Western R. R. has petitioned the Interstate Commerce Commission for the right to build a branch line into Pike County, Kentucky from the Virginia side.

The C. & O. is extending a line from Millard, Ky., in Pike County, along the Levisa Fork to a point near Grundy. The 28-mile project, according to Chief Engineer I. L. Pyle, will cost nearly \$5,000,000. It will reach the properties of the Kentland Coal & Land Co. and touch the border of the Buchanan field in Virginia. The L. & N. Leatherwood Creek branch, costing around \$2,000,000, started in October, will extend 10½ miles from Walter to a new tract being opened in Perry County by the Blue Diamond interests.

Hanna Operations In One Unit

Consolidation of the management of the mines of the Crow Hollow division of the Jefferson Coal Co., near Smithfield, with the other Hanna operations in eastern Ohio was announced Jan. 11 by R. L. Ireland Jr., president, Hanna Coal Co. James Hyslop, St. Clairsville, has been appointed vice-president in charge of operations of these two companies. He was formerly general manager for Hanna.

The Crow Hollow mines have been handled for the last year from Hanna's Cleveland office, but effective at once the management of these mines is being transferred to St. Clairsville. The three Crow Hollow operations, in Jefferson County, employ about 600 men.

Mr. Hyslop has announced that C. R. Nailler, St. Clairsville, has been promoted from production manager to general manager of underground mines. J. S. Harmon, Cadiz, has been promoted from superintendent to general superintendent of strip mines. C. C. Hagenbuch, St. Clairsville, who was chief mining engineer, has been elevated to engineering assistant to the vice-president.

Association Activities

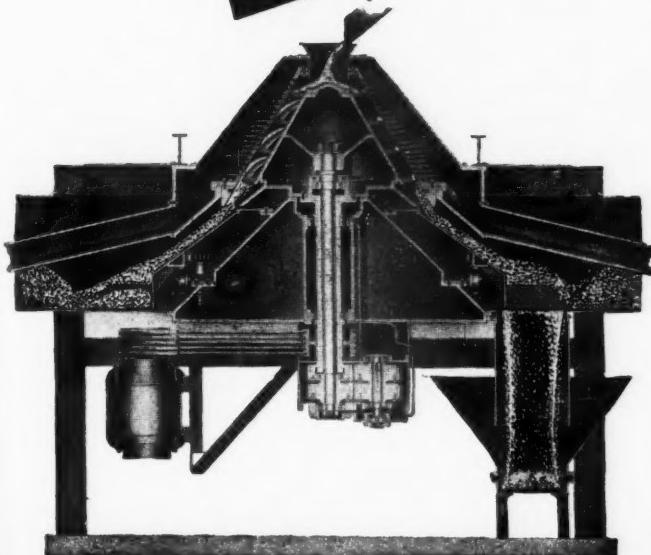
GEORGE P. FITZ, president, Ajax Coal Co., Bulan, Ky., was elected president of the Hazard (Ky.) Coal Operators' Association for the tenth time at the annual meeting of the group held Jan. 14 at Lexington, Ky. Paul Allais, president, Columbus Mining Co., Allais, Ky., was elected vice-president, and A. E. Silcott was renamed secretary-treasurer. John D. Battle, executive secretary, National Coal Association, gave an informal talk reviewing activities in the industry last year and prospects for the coming year.

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SECOND AND PRESIDENT STREETS

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Rubber at Crossroads Electric Group Told

W. F. Hopkins, St. Louis manager, Firestone Tire & Rubber Co., told the Mining Electrical Group, at its 65th meeting, Jan. 6 at the West Frankfort (Ill.) Country Club that "synthetic rubber is a plastic, but it has the same chemical analysis as natural rubber. It differs from the structure of natural rubber or felt particularly in having fibers run parallel instead of being matted."

This structure permits a cut to "run" and very quickly destroy the tire. For this reason cuts in synthetic tires must be repaired immediately; they can't be postponed until tomorrow. In this respect tubes are even worse than tires. Also certain procedures must be followed, such as buffing across the grain—not circumferentially with the tire—and soaping an inner tube before putting it into a tire. Recapped rubber carcasses are better than new synthetic tires—so far.

Strip mines are still in government favor, for natural rubber is still allotted for large truck tires. Since Dec. 20, synthetic rubber must be used for passenger car tires—and travel depends on the nursing it gets.

Mr. Hopkins put on a picture on "Care of Off-the-Road Tires" detailing the art of getting extra mileage from our remaining real rubber tires. The secret is in a three-way consideration of loads, tire pressure and haul roads. Tires must not be overloaded; tire pressures must be correct; the type of tire tread used must conform to the service and the road conditions. If truck tires are to give their limit in mileage, the procedure outlined must be followed. Rubber is so much better than plastic that truck operators will take notice. The available stock of crude rubber is critical and cannot be replaced now.

Large Development Starts in Tennessee

Newly explored coal deposits in Morgan County, Tennessee, near the town of Warburg, are to be developed at an outlay of approximately \$1,000,000. Because of the manpower shortage machinery will be utilized to the fullest extent. Output goal is 50,000 tons monthly, or 50 carloads daily.

Development work has already progressed to the point where a 2,000 ft. slope has been driven into the coal seam, production being tentatively set for Feb. 1. The new opening will serve to exploit roughly 20,000 acres of coal-bearing lands. Much of this area was logged by the Emory River Lumber Co., whose sawmill and complete housing installation is located at Gobey, Tenn. Since the sawmilling operations have been terminated because of lack of merchantable timber nearby the entire village of 85 residences will be taken over by the new coal operators. Other housing and village functional facilities will be added immediately, as an estimated total of 350 to 375 men will be required to operate the mine exclusive of the railway short line

(now under construction) which will connect the new mine with present main-line railroads.

Much use will be made of conveyor belts and rubber-tired shuttle cars. Latest model coal cutters, electric drills and power loaders will complete the installation.

The new 14-mile rail line will be known as the Emory River Ry., an affiliate of the Southern Ry., and will connect with its main line at Lancing. Rock cuts, fills and general grading have been completed and about 50 percent of the steel has been laid.

The new operating concerns are the Mahan-Cheely Coal Co. and the Emory River R.R. Co., affiliates of the Southern Coal & Coke Co., Knoxville, Tenn. B. E. Cheely is president and M. W. Edgerton, vice-president and secretary of the mining company. E. C. Mahan is president and Charles R. Griffith vice president and secretary of the railroad company.

sary to preserve minimum differentials between job classifications to maintain productive efficiency, but requires that adjustments be proportionately less in the higher pay levels, reaching zero at a pay level of \$625 a month.

The ruling covers salaried employees receiving more than \$5,000 a year and executive, administrative and professional employees receiving less than \$5,000.

Mine Fatalities Register Upswing

Coal-mine fatalities in the United States registered an upswing in November, Bureau of Mines figures showing 86 deaths, compared with 75 in the preceding month.

Fatalities at bituminous mines in November last totaled 68 in producing 43,675,000 net tons, indicating a fatality rate of 1.56 per million tons, compared with 1.31 in the preceding month and 2.40 in November of 1942.

The anthracite fatality rate from accidents in November last was 4.36, based on an output of 4,125,000 tons, against 2.06 in the preceding month and 3.55 in the eleventh month a year earlier.

For the two industries combined, the accident fatality rate in November last was 1.80, compared with 1.39 in the preceding month and 2.51 in November, 1942.

Fatalities during November last, by causes and states, as well as comparable rates for the first eleven months of 1942 and 1943, were as follows:

U. S. COAL-MINE FATALITIES IN NOVEMBER, 1943, BY CAUSES AND STATES

State	Falls of Roof	Falls of Face	Haulage	Underground				Total Underground	Open Cut	Surface	Grand Total
				Gas or Dust Explosions	Explosives	Electricity					
Alabama	4	..	2	..	..	..	..	6	..	..	6
Colorado	1	1	..	..	..	..	..	2	..	..	2
Illinois	4	..	2	..	..	..	..	6	..	..	6
Indiana	..	..	1	..	..	..	..	1	..	..	1
Kentucky	6	..	2	..	1	..	..	9	..	..	9
Maryland	..	..	1	..	..	..	..	1	..	..	1
Missouri	..	..	..	..	..	..	..	..	1	..	1
New Mexico	1	..	..	..	..	..	..	1	..	..	1
Ohio	2	..	..	..	..	..	..	2	..	..	2
Penn. (bit.)	9	..	1	..	..	..	..	10	..	..	10
Utah	1	..	1	..	..	..	..	2	..	..	2
Virginia	1	..	..	..	..	..	..	1	..	..	1
West Virginia	10	..	4	11	..	..	1	26	..	..	26
Total bituminous	39	5	14	11	1	1	1	67	1	..	68
Penna. (anth.)	6	5	4	..	..	..	..	15	1	2	18
Grand total	45	6	18	11	1	1	1	82	2	2	86

DEATHS AND FATALITY RATES AT U. S. COAL MINES BY CAUSES OF ACCIDENTS*

January–November, 1942 and 1943

Cause	Bituminous				Anthracite				Total			
	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943
Underground:												
Falls of roof and coal	572	542	1,079	1,016	123	105	2,222	1,897	695	647	1,187	1,099
Haulage	232	205	.438	.384	33	34	.596	.614	265	239	.452	.406
Gas or dust explosions:												
Local	16	22	.030	.041	8	1	.145	.018	24	23	.041	.037
Major	127	147	.240	.276	14	14	.253	.127	161	127	.217	.274
Explosives	18	25	.034	.047	12	8	.217	.144	30	33	.051	.056
Electricity	47	28	.089	.053	5	1	.090	.018	52	29	.089	.049
Machinery	40	22	.075	.041	1	1	.018	.018	41	23	.070	.039
Shaft	4	7	.007	.013	2	1	.036	.018	6	8	.010	.011
Miscellaneous	31	24	.058	.045	10	11	.181	.199	41	35	.070	.059
Stripping or open-cut	19	20	.036	.038	4	9	.072	.163	23	29	.039	.046
Surface	47	49	.089	.092	10	19	.181	.343	57	68	.097	.116
Grand total	1,153	1,091	2,175	2,046	208	204	3,758	3,685	1,361	1,295	2,324	2,200

*All figures subject to revision.

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Comfo Caps



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Obituary

SAMUEL ASHBY, 75, president, Snow Hill Coal Corp. and Midland Electric Coal Corp., died late in December at his home in Indianapolis, Ind. He also was secretary of the Southwestern Illinois Coal Corp. and was credited with several improvements in coal-mining methods.

GEORGE OTIS SMITH, 72, long head of the U. S. Geological Survey, died suddenly Jan. 10 of a heart attack in Augusta, Me. Graduated from Colby College with an A.B. degree in 1893, he received an A.M. there in 1896 and an LL.D. in 1920. He received a Ph.D. from Johns Hopkins in 1896. He joined the Geological Survey in 1896 and was made director in 1907, serving in that capacity until 1930, except for a period in 1922-3 when he was on the U. S. Coal Commission.

JOHN JULIAN HUDDLESTON, 64, general manager and assistant secretary, Algoma Coal & Coke Co. Algoma, W. Va., died Jan. 16 at his home there from a heart attack. He went to work in the company's store about 40 years ago.

H. J. STERNBERG, 60, president, Central State Colliery Co., Canton, Ill., died Jan. 10 of hemorrhage at McGehee, Ark., while on an inspection tour of dredging operations. Besides his coal-stripping interests he was president of Sternberg Dredging Co., which was active as far away as Panama.

GLEN A. KNOX, 62, general manager, Gunn-Quealy Coal Co., Quealy, Wyo., died suddenly Dec. 21 in Rock Springs, Wyo. He succumbed to a heart attack in Wyoming General Hospital, which he entered a week previous for treatment of a skin ailment. Born in Hillsboro, Texas, he went to Wyoming in 1907, where he was first employed in the engineering department of the Union Pacific R.R., later becoming associated with Mr. Quealy in Kemmerer and Rock Springs. He also was an active member of the Southern

Wyoming Coal Operators' Association, had served as chairman of the Wyoming section of the American Institute of Mining and Metallurgical Engineers, was elected president of the Rocky Mountain Coal Mining Institute in 1936, and was secretary of the Wyoming Taxpayers' Association at the time of his death.

EDWARD W. ("JUDGE") PARKER, 83, long prominent in the anthracite industry, died Jan. 3 in Philadelphia, Pa. Starting as an accountant in Baltimore, he was business manager of the Statesman, 1885-9; was appointed to the eleventh census in 1889, and two years later became statistician of the U. S. Geological Survey, being named chief of the Division of Mineral Resources in 1907. He was managing editor of *Engineering and Mining Journal*, 1901-2, and director of the Anthracite Bureau of Information and secretary-treasurer of the Anthracite Institute and its predecessor organizations from 1915 until 1939, when he retired.

EUGENE CLIFT MORGAN, 56, general manager and treasurer, Black Creek Coal & Coke Co., and a widely known executive in the Alabama coal field for about 35 years, died Dec. 30 at a Birmingham hospital after a brief illness. A native of Birmingham, he received his degree as engineer of mines at Alabama Polytechnic Institute. His first business connection was with the St. Louis & San Francisco R.R., and then with the old Alabama Consolidated Coal & Iron Co., first as mechanical engineer and later as chief engineer. He filled positions as chief engineer and general superintendent of the Central Iron & Coal Co., Holt, Ala., from 1921 to 1923. In the latter year he developed the Thermal mine of the Black Creek Coal & Coke Co.

JOHN GRAVELL, 63, for the last twelve years outside foreman at the Hazleton Shaft colliery of the Lehigh Valley Coal Co., Hazleton, Pa., died Jan. 6 of a stroke which he suffered while at work. For many years he was foreman at Heidelberg colliery of the Heidelberg Coal Co. and Exeter colliery of the Payne Coal Co.



E. W. Parker

ers from Italy and Germany with mining experience who would be familiar with this work." His company needs 3,000 men, Mr. Inglis stated, and the entire anthracite industry could use 17,000. Besides giving prisoners regular contractual wages he said his company would be willing to try to solve housing and other problems.

Violent opposition to the suggestion was expressed by Hubert Farrell, acting president, District 1, U.M.W. The present tight hard-coal situation, said Mr. Farrell, might be of short duration and that once the war ended the "artificial" market for anthracite would disappear. Mr. Farrell also helped swell the volume of newspaper and other protests against the ban on shipments of anthracite west of the Ohio-Pennsylvania line.

The Kentucky action followed a request for investigation from Sam Caddy, president, District 30, U.M.W., who wired Secretary Ickes that hundreds of boys under 18—some as young as 14—were being employed in small Kentucky mines. He also notified G. Moss Patterson, chief of the State Department of Mines and Minerals, that the matter had been called to the attention of the governor. Mr. Patterson, however, called attention to the fact that under the Kentucky laws the age limit for mine work is 16 and that Caddy was in error in his allegations about promotion of child labor within the State.

Caddy's protest brought an order from the Coal Mines Administration Jan. 18 notifying U. S. operating managers in Kentucky that "government possessed mines must not be operated in violation of state or federal laws." This order followed an investigation by Harrison Combs, associate director, CMA Health and Safety Division. "The information I gained," said Mr. Combs' report, "would seem to substantiate Mr. Caddy's complaint. However, very few truck mines are under government control."

The notice to Kentucky operating managers read as follows:

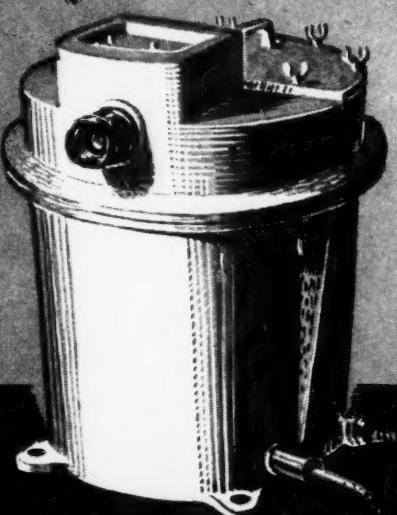
"The Coal Mines Administration has been informed that there are some in-



Glen A. Knox

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stances of violations of the Child Labor Act of Kentucky and Order No. 3 issued by the Childrens' Bureau of the Department of Labor pursuant to the Fair Labor Standards Act of 1938.

The Child Labor Act of Kentucky provides that no child under the age of 16 years shall be employed in any capacity in, about or in connection with any mine, coke oven or quarry. Order No. 3, issued by the Childrens' Bureau, pursuant to the Fair Labor Standards Act of 1938, prohibits the employment of children under 18 years of age in coal mines which produce coal for interstate commerce.

"Government possessed mines must not be operated in violation of state or federal laws or regulations and the Interior Department will take the steps necessary to assure compliance with such laws and regulations. Accordingly, if there are any children employed in violation of the state law or the federal regulation at the mine or mines for which you are the operating manager for the United States you shall forthwith terminate the employment of all persons so illegally employed."

Canada Fuel Situation Causes Concern

Terming the fuel situation in Canada one "that causes grave concern," the Dominion Bureau of Statistics reports that production in 1943 was 17,878,778 tons, 5 percent less than in 1942. "Manpower shortage and the great increase in coal for industrial and domestic uses brought about a critical shortage," said the report. "Steps were taken to increase the labor supply, and during the last half the monthly output showed an upward trend."

Canadian mines reported a net increase of 3,122 workers June 1 to Nov. 30, Humphrey Mitchell, Minister of Labor, reports. Additions brought the total employed to 27,986 on Nov. 30, compared with 24,864 on June 1. Most of the additional workers, said Minister Mitchell, came from these sources: compulsory return to the mines of ex-coal miners; voluntary return on leave of skilled miners from the armed forces; and recruiting of workers, largely unskilled, by Selective Service offices. In addition, some Prairie farmers who work seasonally in mines returned to that occupation for the winter.

Mr. Mitchell announced Jan. 21 that blanket postponement of military training for men employed in coal mining had been extended to Aug. 1, 1944. Similar extension has been applied to the ban on acceptance of coal miners for voluntary enlistment in any branch of the armed forces. The original order-in-council arising from labor shortages was passed May 17, 1943, and was to have expired Feb. 1, 1944.

The Dominion Coal Co. announced that its price of coal to consumers had been advanced \$1.06 a ton effective Jan. 3. The company is one of four Nova Scotia concerns ordered by the National War Labor Board to grant \$1 a day wage increase and vacations with pay to em-

EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the Bureau of Mines in December, as follows:

Jeffrey Mfg. Co.—Type 35-BC shortwall mining machine; 35-hp. motor, 220 volts, a.c.; Approval 493; Dec. 10.

Jeffrey Mfg. Co.—Type 61 power unit for conveyors; 5-hp. motor, 500 volts, a.c.; Approval 452-A; Dec. 16.

ployees. Caledonia local, U.M.W., protested against increasing the cost of coal to miner consumers, alleging that this would be a contract violation.

The Wartime Prices and Trade Board announced Jan. 4 that an increase of 95c. per ton for coal at retail had been authorized by the Coal Administrator to four operators in Nova Scotia to meet wage increases granted by the National War Labor Board. The increases, which became effective Jan. 1, are subject to review at any time, but in any event must be reviewed not later than April 30.

P-56 Amended

Following issuance of a revised P-56 order on Dec. 24, WPB amended the revised version Jan. 20 to clear up certain provisions and correct typographical errors. As revised and amended, the new order revokes Orders P-58 and P-73, operations formerly conducted under them now being included in the definition of producers under P-56.

Capital additions not exceeding \$500 are included in the definition of "maintenance, repair and operating supplies." Until forms can be revised, operators must apply by letter to the Mining Division for a dollar-value quota of minor capital additions for the 1st and 2d quarters of 1944. Also, the order now explains that a single aggregate quota may be applied for by a producer with several plants or operating units, even though separate records are maintained on MRO supplies. In such cases, the letter of application must designate the serial numbers of the several units involved.

An error in Par. "g" of the Dec. 24 order has been corrected to make it clear that preference ratings assigned for MRO supplies by the Mining Division may not be used to obtain items in Lists A or B of Priorities Reg. No. 3. Also, it is made clear that the restrictions on resale of material apply to any material (including machinery and equipment) which has been used in the conduct of any enterprise covered by Order P-56, whether or not such material was obtained through priorities assistance under any order.

In the section requiring prior application to the Mining Division on Form WPB-2910 for machinery, materials or equipment in cases where special application is required by some other office or division of WPB, it is now clearly stated in the order that this is not required for MRO supplies on quotas authorized by the Mining Division or after filing a project application.

The new order places smelters and refiners under the same inventory provisions as previously applied to mines under P-56. Sales of excess or idle materials covered in Priorities Reg. No. 13 are permitted subject to the Jan. 20 amendment. All privileges granted in other WPB orders to persons operating under Reg. No. 5 are permitted producers operating under P-56. Subject also to the Jan. 20 amendment, mines and smelters desiring to obtain machinery and equipment must make prior application to the Mining Division, as well as for MRO supplies where a preference rating is necessary.

Railroad track frogs and switches, effective Jan. 1, were reclassified as Class B products rather than controlled materials. Frogs and switches for mines, formerly included in "track accessories" as controlled material on the quota application forms, will now be purchased as part of the dollar-value quota assigned for MRO supplies, and producers must furnish their suppliers with their preference ratings where orders have been placed for delivery after Dec. 31, 1943.

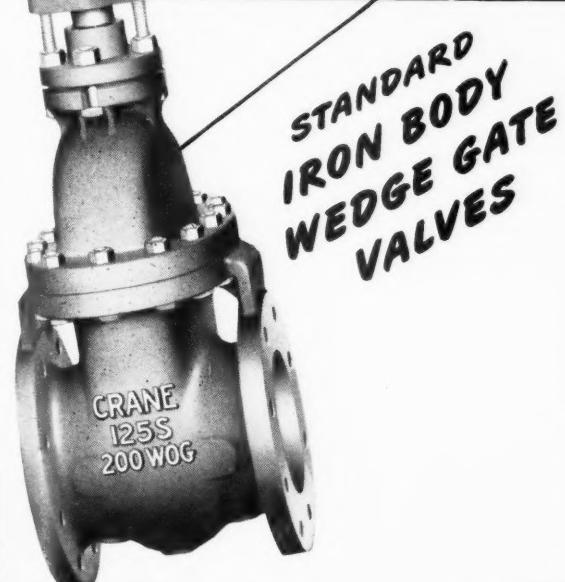
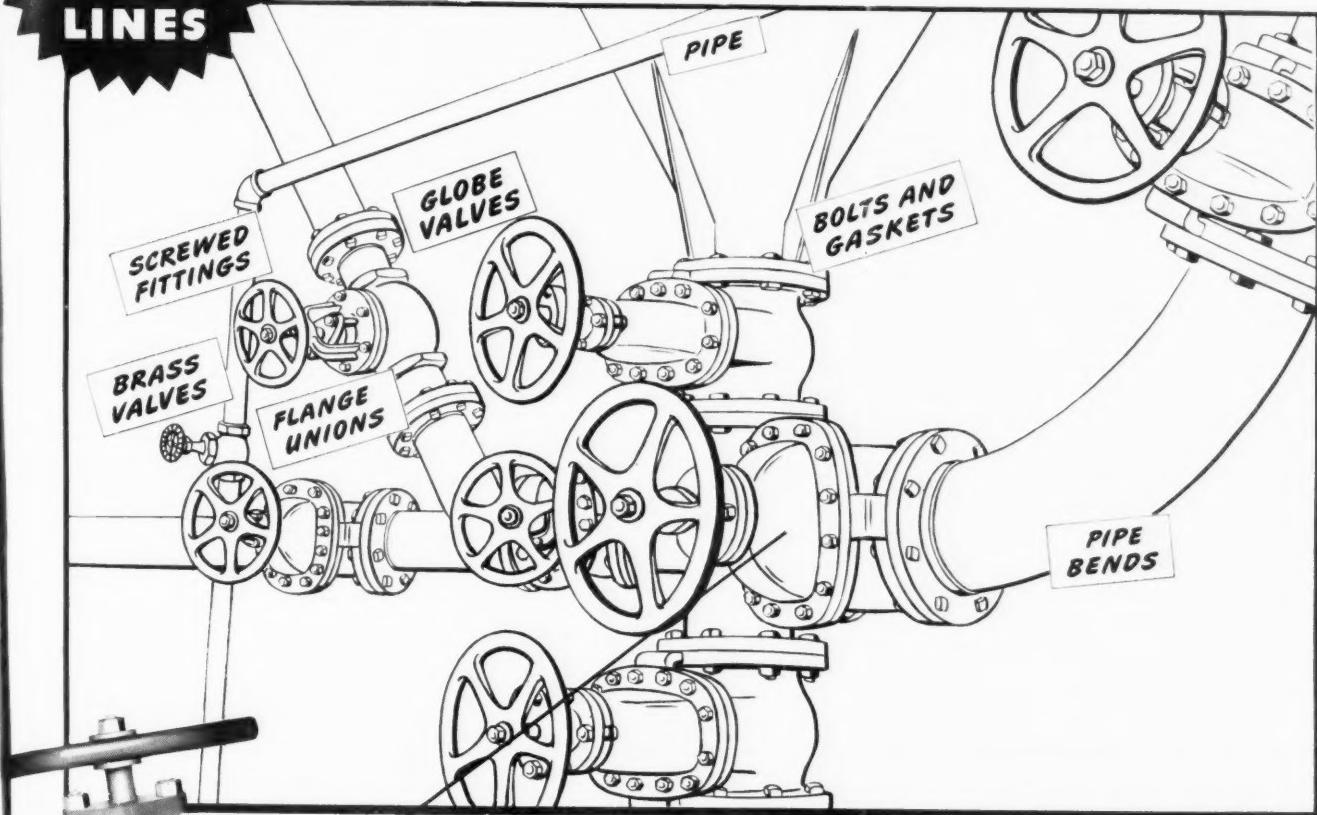
Wire and cable manufacturers were notified by WPB's rubber director on Dec. 30 that because Neoprene consumption exceeds its present production it will not be available for civilian use with the exception of oil-resistant jackets. This was viewed in the industry as presenting a serious problem inasmuch as there still remained difficulties in curing other synthetic rubber compounds for jacket use.



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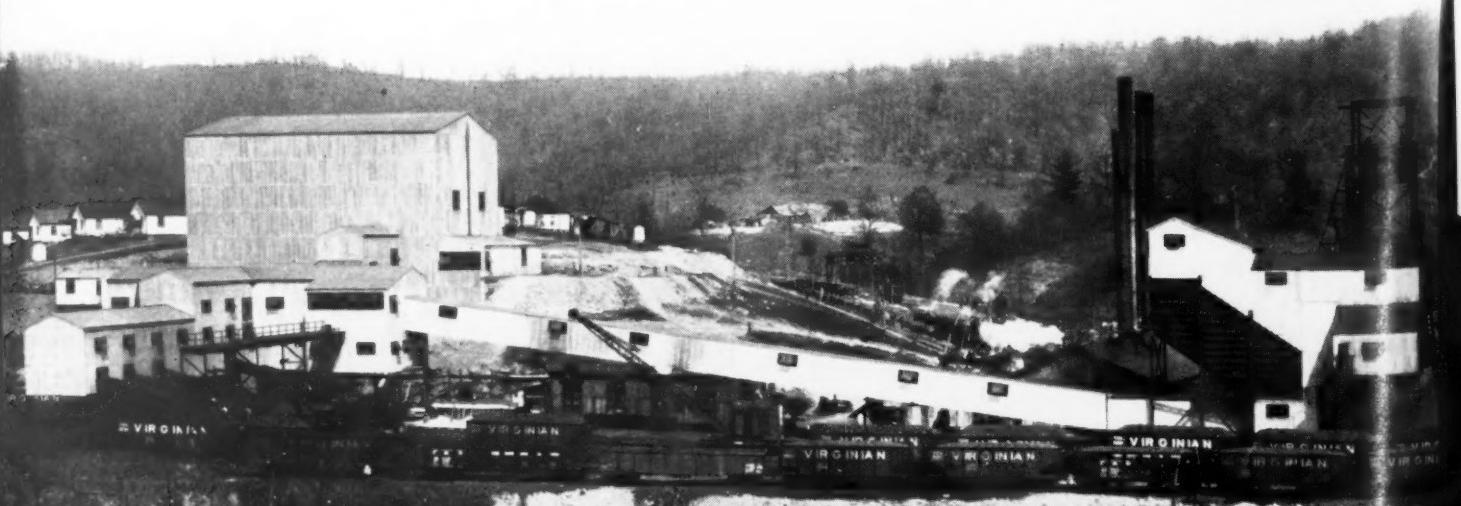
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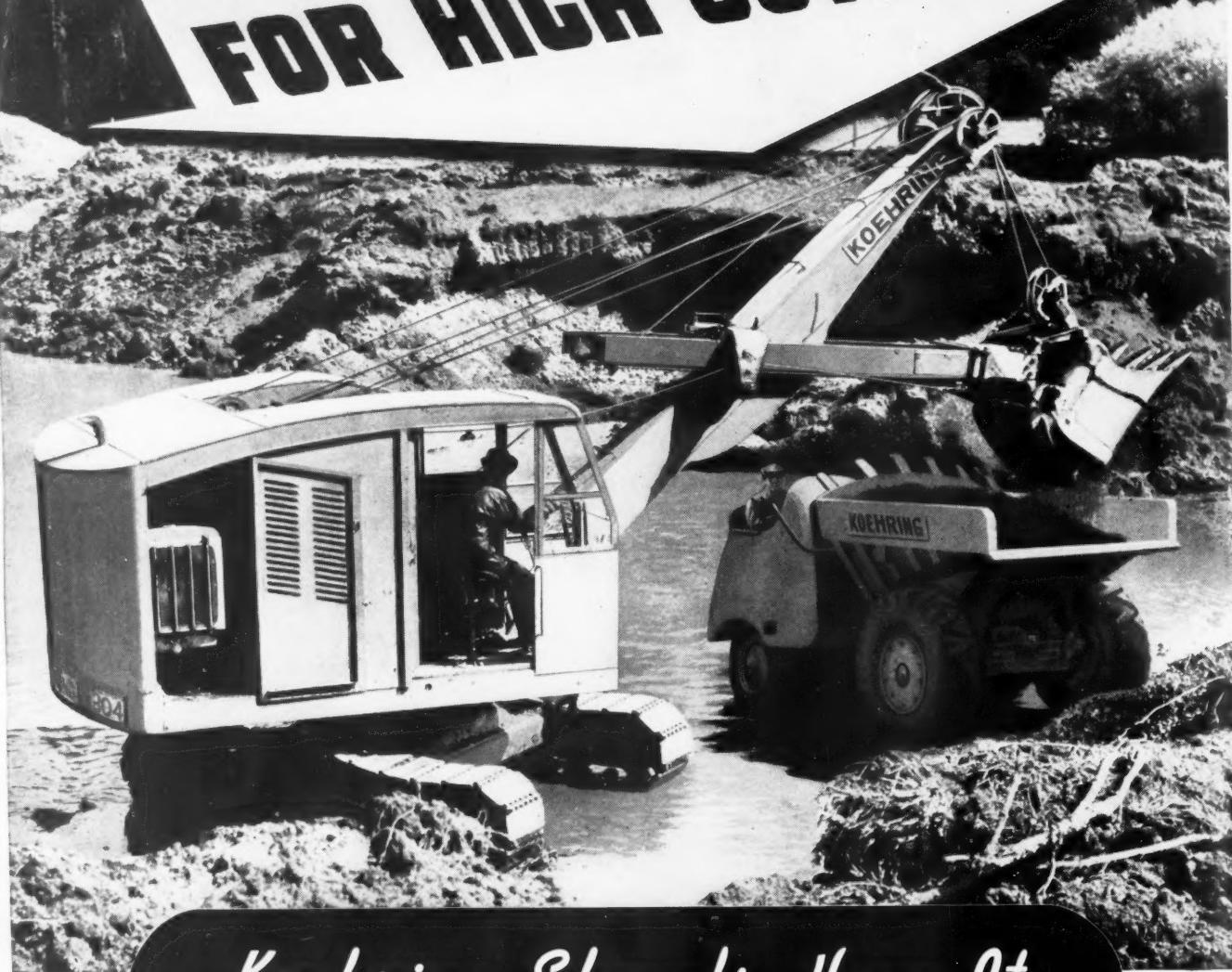
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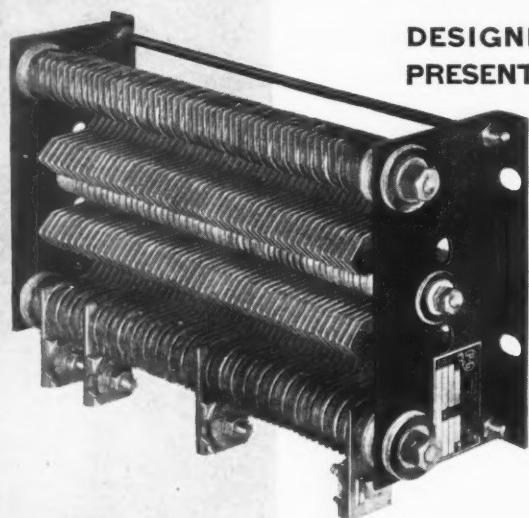
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Coal Companies Ask Silt Suit Quash

Twenty-one of the 24 anthracite mining companies being sued by the city of Philadelphia to restrain them from dumping silt into the Schuylkill River and its tributaries jointly petitioned Common Pleas Court No. 1 on Dec. 21 to dismiss the action. The companies contended the complaint should be dismissed because it did not set forth any "special injury." Furthermore, it was said that even if such injury could be shown the city was not entitled to an injunction because of its undue delay in bringing suit.

A plan calling for the use of sedimentation ponds at collieries was outlined by the State Sanitary Water Board at a meeting Jan. 18 at Harrisburg before about 50 operators invited to discuss the problem of ridding streams of silt. The board said it expected the operators to cooperate in the plan. J. R. Hoffert, assistant board engineer, said the board hopes to extend the use of ponds to the other hard-coal fields. It was pointed out that one of the larger companies in the Southern field already has installed equipment to remove practically all waste material.

A.I.M.E. Coal Section Lists 17 Papers

Management, preparation, safety, ventilation and utilization are among the subjects to be discussed at the annual meeting of the Coal Division, American Institute of Mining and Metallurgical Engineers, Feb. 21-23 at the Waldorf-Astoria Hotel, New York City. Five sessions will be held. The papers are as follows:

"Water-Handling Arrangements in the Anthracite Region," Walter Lutz and John T. Griffiths.

"Prevention of Water Inflow by Sealing Stream-Bed Cracks," Charles J. Golden and Vaughan Wilson.

"Anthracite and Semi-Anthracites in the United States," Allen J. Johnson, Anthracite Industries, Inc.

"Management in Coal Mining," W. W. Beddow, vice-president, Logan County Coal Corp.

"Research for the Coal Industry," C. E. Lesher, president, Pittsburgh Coal Carbonization Co.

"Coal Breaking With Cardox," E. C. Skinner, Pittsburgh Coal Co.

"Preliminary Study of the Pittsburgh Seam in Western Pennsylvania With Particular Reference to Its Sulphur Characteristics and Beneficiation," D. H. Davis, product control manager, Pittsburgh Coal Co., and John Griffen, sales engineer, McNally-Pittsburg Mfg. Corp.

"Operation of a Froth Flotation Pilot Plant on Washery Water Solids at a Breaker of the Lehigh Navigation Coal Co., Inc.," C. D. Rubert, superintendent of preparation, and W. J. Parton.

"Use of Rock Dust to Prevent Explosions in Coal Mines," H. P. Greenwald, supervising engineer, experimental mine section, U. S. Bureau of Mines.

"Standards for Safety Clothing and

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CAR SPOTTING HOISTS . . . Brownie hoists are used throughout the coal fields to spot cars at loading points. Model HKM, shown here, is rated 6,000 lbs. rope pull at 25 ft. per min. Overall height 20".

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Their Relation to Accident Reduction," C. E. Berner, superintendent, Pennsylvania Coal Mine Rating Bureau.

"Methods of Dust Control to Reduce Possibility of Occupational Diseases," D. Harrington, chief, health and safety branch, U. S. Bureau of Mines.

"Use of Traps and Blowers for Auxiliary Face Ventilation," Ventilation Committee, Coal Division—Raymond Mancha, chairman.

"Coke Formation in Domestic Stokers," Walter Knox, H. D. Conkey Co., and C. H. Sawyer, research department, Koppers Co.

"Wear and Tear Effect of Dust-Alleviating Treatment on Domestic Coal-Burning Equipment," William A. Staab, department of mining engineering, School of Mines, West Virginia University.

"Bureau of Mines Research on the Liquefaction of Coal," A. C. Fieldner and H. H. Storch, fuels and explosives service, U. S. Bureau of Mines.

"Behavior of Coals in Coke Ovens," B. P. Mulcahy, research engineer, Citizens Gas & Coke Utility, Indianapolis, Ind.

"Production and Use of Low-Temperature Char as a Substitute for Low-Volatile Coal in the Production of High-Temperature Coke," J. D. Price, superintendent, byproduct coke plant, Colorado Fuel & Iron Corp., and G. V. Woody, Allis-Chalmers Mfg. Co.

"Control of Sulphur and Ash in Mine-Run Metallurgical Coal," H. DeKay Jr., L. A. Turnbull, J. N. Scudder and A. L. Toenges, Central Experimental Station, U. S. Bureau of Mines.

Red Ray Mine Wins Safety Award

Employees of the Red Ray mine, United Electric Coal Cos., Freeburg, Ill., have been presented with a safety trophy won in competition with twelve other strip operations in Illinois and Indiana. The mine has gained permanent possession of the trophy by winning it in three six-month periods since April, 1941, according to Carl Day, superintendent. Over the entrance to the mine property is the slogan: "Always Alert; Never Hurt."

Seek Restoration Of Pa. Strip Land

Legislative action to halt destruction of land by strip mining is favored by the Pennsylvania Association of County Commissioners. Meeting with association officials and members of the executive and legislative committees at Harrisburg Jan. 22, John N. O'Neil, chairman of the legislative committee, declared: "We feel that the Legislature should take appropriate steps to assure the leveling off and restoration of land for use again after it has been gouged by the mine strippers' machinery." He said he would make the recommendation to a legislative committee which is studying the stripping problem. The committee will hear interested persons to receive data at a meeting in Harrisburg in February.

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2. Observable results. Besides keeping such records, a test of this kind should be followed closely to observe and note significant facts which cannot easily be tabulated, such as gear case temperatures, operating characteristics, ease of handling, etc.

3. Conditions must be comparable. All conditions that can be controlled should be the same for both

the new lubricant being tested, and that regularly used such as the type, age, and condition of the loaders, hours of operation, etc.



... Reports on how machines handle
are valuable

4. General precautions

Clean cases thoroughly: Be sure all the old lubricant is removed before installing the new lubricant. Coking of the old lubricant in the machine might cause trouble for which the new lubricant is in no way responsible.



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Use the amount of lubricant recom-

Oil is Ammunition ... Use it Wisely

mended by the loader manufacturer, or lubricant manufacturer's representative. Too much lubricant may cause overheating or leakage which is not the fault of the lubricant.

Be sure you have the right grade:
The lubricant manufacturer's representative should analyze operating conditions, and because of his knowledge of his own lubricant, recommend the grade to be used.

For additional copies of the information given above, and for other information on how to test mine loader lubricants, including sample forms for keeping test records, send the coupon below. Just paste it on a postcard addressed to Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 5, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

SEND FOR THIS FOLDER



- Standard Oil Company (Indiana)
- Room 1224, 910 S. Michigan Ave.
- Chicago 5, Illinois
- Gentlemen: Please send me the folder "How To Test Mine Loader Lubricants."

Name _____

Company _____

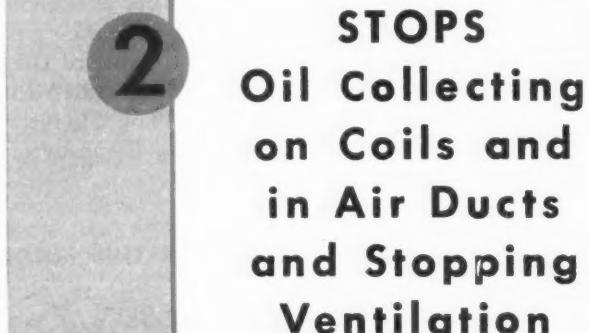
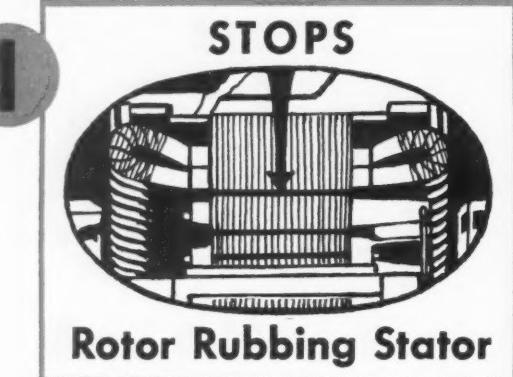
City _____ State _____

STANDARD OIL COMPANY (INDIANA)

**STANDARD
SERVICE**

★ LUBRICATION ENGINEERING

4 WAYS that KEYSTONE Ball Bearing END BELLS Prolong Motor Life . . .

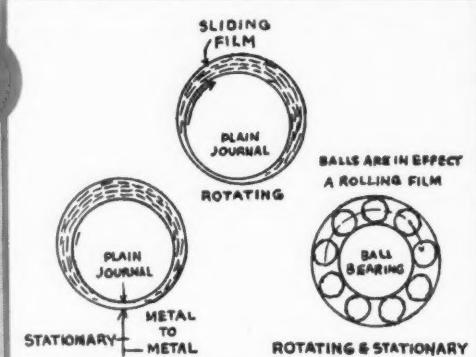


Much of your motor expense results from Sleeve Bearings . . . from the wear that occurs in them, and from their continuous leakage of oil. Here's how KEYSTONE Ball Bearing End Bells check these troubles:

1. On A.C. Motors, KEYSTONE stops bearing wear, shaft and rotor are concentric, hence no "wobble" and no chance for rotor to rub the stator.
2. On both A.C. and D.C. motors KEYSTONE Ball Bearings, lubricated with grease, retain their lubricant and stop troubles due to oil and dust accumulating on coils, or constricting ventilation ducts.
3. Shaft cannot wear when provided with ball bearings. This stops costly shaft renewals and trouble No. (1).
4. No need for frequent inspection, as required by sleeve bearings. Also much less frequent lubrication.

KEYSTONE End Bells with Ball Bearings come to you ready to install. They fit your motor—just give us the motor nameplate data. You use the old shaft. Let us tell you the whole story—including the ECONOMY of KEYSTONE.

Write for the Descriptive Folder



KEYSTONE Electric
Company
1224 RIDGELY STREET . . . BALTIMORE . . . MD.

COMING MEETINGS

• American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 20-24, Waldorf-Astoria Hotel, New York City.

• American Society for Testing Materials: spring meeting, Feb. 28-March 3, Netherland Plaza Hotel, Cincinnati, Ohio; annual meeting, June 26-30, Waldorf-Astoria Hotel, New York City.

• Anthracite Operators' Association: annual meeting, March 10, Wilkes-Barre, Pa.

• Mine Inspectors' Institute of America: annual meeting, June 5 and 6, Daniel Boone Hotel, Charleston, W. Va.

Crescent Mining Co. Makes Changes

Crescent Mining Co. transferred Crescent No. 1 mine, Peoria, Ill., on Dec. 27 to the Rock Island Improvement Co., a subsidiary of the Rock Island R. R. Officers of the purchasing company, which will continue to operate the mine, are: James Hope, vice-president; Alva H. Nash, chief clerk and cashier; Lester W. Haney, purchasing agent; Claude Dinkel, electrical engineer and mine electrician; William Watson, mining engineer and safety engineer; Emil Homerin, mine superintendent. Norman Prudent, who has been general superintendent for the Crescent company for the last seven years, has been transferred to Centralia, Ill., as general superintendent of the Centralia Coal Co. Kenneth Neibsch, formerly master mechanic at Crescent, also has been transferred to Centralia as master mechanic.

Hott to Produce

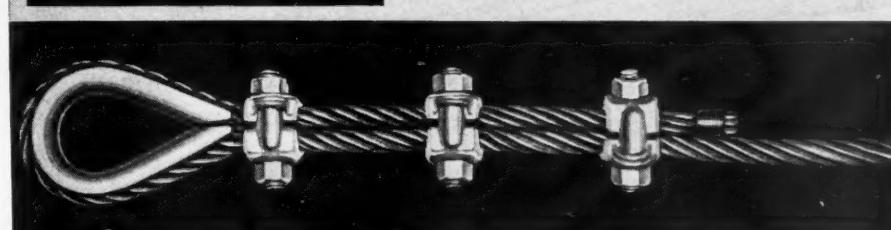
Hott Coal Corp. announced Jan. 4 that it would start production at its mine near Clarion, Pa., the latter part of January. The coal will be mined by the open-cut method and will be shipped on the Baltimore & Ohio R. R. Output will be 800 tons per day until May 1, and thereafter 1,000 tons daily. The seam worked is the Kittanning, running about 7 per cent in ash and less than 2 per cent sulphur.

Lewis Reentry Terms Rejected by A.F.L.

Meeting at Miami, Fla., Jan. 24, the executive council of the American Federation of Labor rejected the stipulation of John L. Lewis that the United Mine Workers of America be readmitted to the federation on its own terms—with most of its present membership—but offered to receive the miners' union as it was constituted in 1936. An opening for possible reaffiliation of the miners at the next meeting of the council in May was left, as the A.F.L. five-man negotiating com-



THESE
SAFETY "FIST-GRIP" CLIPS
SAVE METALS • SAVE TIME
PREVENT ACCIDENTS



Save Metals—25% fewer clips do the job better.

Save Time—fewer clips to put on—nuts tighten faster, with any type wrench.

Prevent Accidents—can't be put on backwards.

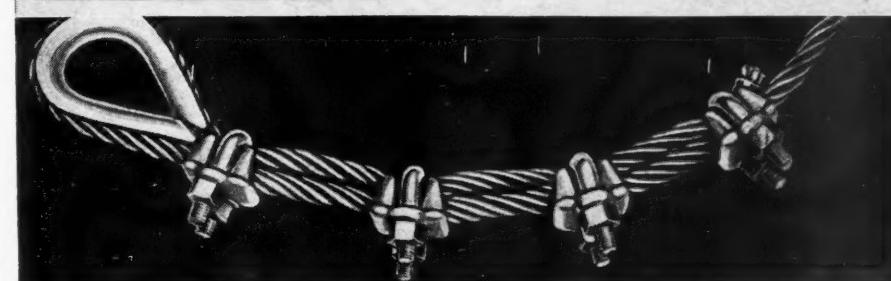


THESE "FINGER-PINCH"
CLIPS WASTE METALS

More clips required. Pinch and distort rope. Protruding bolts easily damaged.

WASTE TIME

Must be applied with saddles on load end of rope. Can't be tightened unless proper wrench is handy.

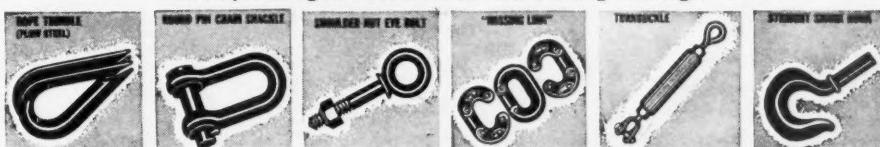


SAVE MEN, MATERIALS, AND TIME WITH
LAUGHLIN "FIST-GRIP" CLIPS

*Laughlin's complete line of wire rope and chain fittings
is distributed through Mill, Mine and Oil Field Supply Houses*

FORGING A SHARE IN VICTORY

THE THOMAS LAUGHLIN Company
Portland 6, Maine
Look for Laughlin Products in Coal Mining Catalogs.



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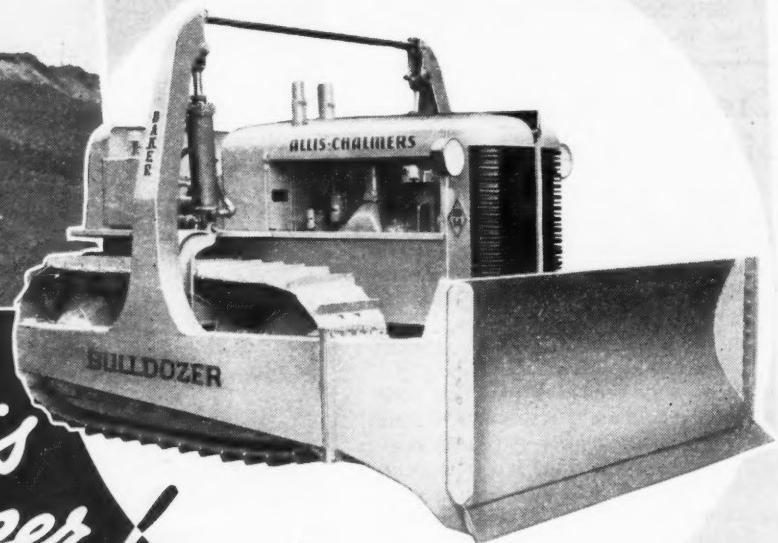
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*There's Never
a Dull Moment*



*For This
Baker Bulldozer!*

An Indiana coal mine operated by a power generating company uses a Baker Hydraulic Bulldozer on an Allis-Chalmers Model HD-7W Tractor. The coal comes up from a shaft mine located alongside the 125,000 k.w. power plant, and, after going through the pulverizer, is conveyed to the boilers. The large tonnage of coal consumed makes cinder handling a big job in itself.

Between the mine and the power plant there are plenty of tasks for which the Baker Bulldozer has proved expeditious and economical. These functions may be grouped under two heads:

- (1) At the mine—to level slack, prepare right-of-way for trackage, and to pile, level and compact coal for storage before its pulverization for combustion in the boilers.
- (2) A tremendous volume of cinders from the boilers is hauled to a fill near the plant in side dump cars, and here again the bulldozer, as shown in the pictures, does a spreading, leveling and compacting job.

Ability to handle so many jobs rapidly and at low cost is one reason why so many coal mining operations—strip and shaft—bituminous and anthracite—are using Baker Hydraulic Bulldozers.

Ask for Catalog 839.

THE BAKER MFG. CO.
514 Stanford Ave., Springfield, Ill.

BAKER

*The Modern Tractor Equipment Line
for EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE*



Awarded
the
"E"
flag for
proficiency
in
production.

mittee was instructed to confer again with U.M.W. representatives to clarify all questions that have not been settled.

The action of the executive council was announced by President William Green of A.F.L. as follows: "The executive council has considered the report of its committee, the letter submitted by President Lewis and the application of the United Mine Workers of America for reaffiliation with the American Federation of Labor in a sympathetic way. The council proposed that the United Mine Workers return with the jurisdiction they had when they left the federation. The council instructs its committee again to meet with a committee representing the United Mine Workers for the purpose of clarifying all questions that have not been settled."

Reopen Tidewater Case

By a vote of six to five the Interstate Commerce Commission on Jan. 15 granted the petition of complainant producers to reopen the Alden Coal Co. vs. Central R.R. of N. J. case, better known as the tidewater case. The Commission had previously dismissed the complaint by a vote of five to four, with two members not voting.

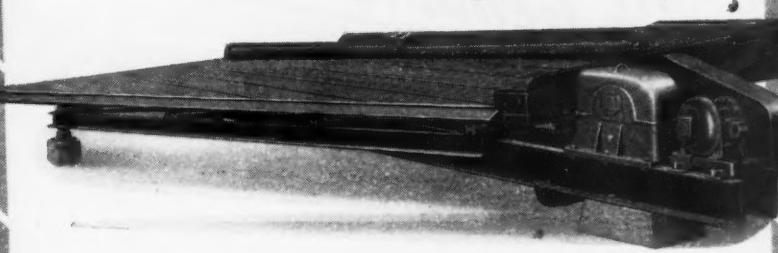
Ickes Is Upheld On Retaining Mines

While return of small non-union operations continued in limited numbers and the War Labor Board wrestled with approval of the new bituminous contract, Attorney General Francis Biddle ruled Jan. 17 that production records alone need not necessarily be the basis for return of coal mines by the government. The ruling was made in response to a request by Secretary Ickes for an interpretation of the War Labor Disputes Act's 60-day clause.

In his request to Biddle, Secretary Ickes pointed out that mines seized by the government Nov. 1 had reached normal production tonnages by Nov. 15. But the Attorney General agreed with Ickes' assumption that "productive efficiency" had not necessarily been restored as a result. "The productive efficiency of a mine," said Biddle, "cannot be determined alone by the physical volume of coal produced at a given time. It is also necessary to consider whether, if the government relinquishes possession, there will be further interference with production through strikes or stoppages or threats of strikes or stoppages." In this connection, Biddle alluded to Ickes' contention that restoration "when the contract negotiations are not completed" might lead to renewed work stoppages.

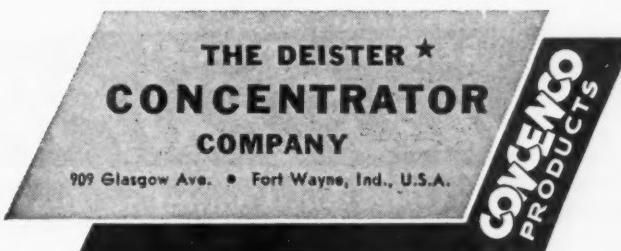
Meanwhile, Ickes announced that nearly 3,000 mines are still being operated by the government—largely those that traditionally have contracts with the United Mine Workers. Some 476 or more have been returned, mostly small operations.

Step Up Marketable Coal Production with SuperDuty



Many coal mine operators are stepping up their marketable coal production by modernizing with SuperDuty Diagonal Deck Coal Washing Tables. SuperDuty Tables, backed by 37 years of engineering "Know-How", assure you the maximum . . . in recoveries, in savings of critical time and labor, and in daily output of marketable coal from your mined quotas.

You, too, can step up your marketable coal production by modernizing with SuperDuty . . . prevent bottlenecks in your coal washing operations . . . minimize wasteful losses . . . and increase operating profits. Write for illustrated Bulletin No. 119-A and complete details.



★ The ORIGINAL Deister Company • Inc. 1906



Crews get back to work quicker after blasting when *Genuine Flexipipe* ventilation clears away smoke and fumes. And they work better with fresh air Flexipiped to the face at which they are working. These are two reasons why *Genuine Flexipipe* steps up production.

Made of tough, specially woven and treated material, *Genuine Flexipipe* can take the hard knocks of every-day use. It is resistant to damage from gas, fungus growth, heat, acid and alkaline waters. *Genuine Flexipipe* comes in three grades.

Mail the coupon today for descriptive literature on *Genuine Flexipipe*.



EASY TO HANDLE! *Genuine Flexipipe* is easy to carry. 1000 feet, with blower equipment, can be loaded in one mine car.



EASY TO INSTALL! A thousand feet of *Genuine Flexipipe* has been installed in less than an hour.



FLEXIBLE INSTALLATION! *Genuine Flexipipe* can be threaded through narrow irregular passages without cutting ventilating efficiency.

BE SURE YOU GET *Genuine FLEXIPIPE*

The Original Flexible Ventilating Tubing

BEMIS BRO. BAG CO., 408-0 Pine Street, St. Louis, Missouri

Please send literature on *Genuine Flexipipe*.

Name _____

Company _____

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P. & R. Starts Suits To Oust Bootleggers

A series of injunction actions has been started by the Philadelphia & Reading Coal & Iron Co. to oust so-called bootleg miners from its anthracite properties in Schuylkill and Northumberland counties, Pennsylvania. The company charged the free-lance workers with trespassing, erecting buildings, digging and mining on its premises, and asked that the defendants be required to pay 50c. a ton for coal removed from its property.

Temporary injunctions restraining the bootleg miners were issued Dec. 30 by Judge James C. Curran and on the following day by Judge Cyrus M. Palmer and Judge H. W. Cummings. At each of the hearings set on the company's plea to make the restraining orders permanent the defendants obtained a continuation of the hearing.

The suit before Judge Cummings was

In Step With Coal Demand

Bituminous Coal Stocks

	Thousands	P. C. Change	
	Net Tons	From No. 1	From Dec. 1
Dec. 1 1943	15,938	-10.6	-23.1
Electric power utilities	5,820	-12.6	-47.8
Byproduct coke ovens	703	-21.3	-41.7
Steel and rolling mills	10,335	-17.7	-22.2
Railroads (Class I)	22,207	-13.6	-32.7
Other industrials*			
Total	54,903	-13.7	-30.7

Bituminous Coal Consumption

	Thousands	P. C. Change	
	Net Tons	From Nov. 1943	From Nov. 1942
Nov. 1943	6,863	-6.2	+23.2
Electric power utilities	7,325	-5.0	-0.1
Byproduct coke ovens	962	+2.1	+10.9
Steel and rolling mills	11,089	-0.6	+7.9
Railroads (Class I)	13,840	+3.6	+1.3
Other industrials*			
Total	40,079	-1.0	+6.3

*Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

December, 1943, net tons....	52,600,000
P.c. change from Nov., 1943....	+16.9
P.c. change from Dec., 1942....	+5.7
Jan.-Dec., 1943, net tons....	589,000,000
P.c. change from Jan.-Dec., 1942....	+ 1.5

Anthracite Production

December, 1943, net tons....	4,970,000
P.c. change from Nov., 1943....	+20.7
P.c. change from Dec., 1942....	+ 7.1
Jan.-Dec., 1943, net tons....	60,327,000
P.c. change from Jan.-Dec., 1942....	-0.000016

Sales, Domestic Stokers Vs. Oil Burners	Stokers	Burners
November, 1943.....	2,558	2,005
P.c. change from Oct., 1943.....	-8.1	-83.9
P.c. change from Nov., 1942.....	+28.3	+5.3
January-November, 1943.....	24,684	15,797
P.c. change from Jan.-Nov., 1942.....	-69.9	-70.5

Index of Business Activity*

Week ended Jan. 22.....	243.8
Month ago.....	241.6
Year ago.....	222.3

*Business Week, Jan. 29.

Electric Power Output†

Week ended Jan. 22, kw.-hr....	4,531,662,000
P.c. change from month earlier....	+5.5
P.c. change from year earlier....	+14.0

†Edison Electric Institute.

"Pro
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COAL

**"Gulf Quality Lubricants
help keep every section up to its full
quota of tonnage" —**

SAYS THIS MINE FOREMAN



Actual photograph of a Gulf Lubrication Service Engineer (left) consulting with Mine Foreman and Section Foreman on the lubrication of mechanized equipment.

"Proper lubrication with Gulf oils and greases is a big factor in keeping every section in the mine up to full production," says this Mine Foreman. "These quality lubricants make possible continuous operation of equipment and help us hold maintenance costs down."

Gulf technologists have developed oils and greases which are contributing to greater operating efficiency in many mines. By reducing wear to an absolute minimum, these improved lubricants help improve production, reduce maintenance costs, and lengthen the useful life of machines.

If you feel more production is possible in your mine from equipment that seems to be operating

at capacity, here is a practical suggestion: Call in a Gulf Lubrication Service Engineer. Ask him to make a study of your machines, then give you his recommendations for improved lubrication practice which will increase their efficiency. He may be able to help you obtain the extra production you want. Write, wire, or phone your nearest Gulf office today.

**GULF OIL CORPORATION
GULF REFINING COMPANY**
Gulf Building, Pittsburgh, Pa.



DO POWER FAILURES SABOTAGE YOUR MINE?



THEN PROTECT WITH **DELTABESTON**

Heat, moisture, oil and grease can keep your maintenance shop busy repairing mine locomotives, loaders, and cutters when they should be in the pits producing more and more coal. Today, coal mines can't afford to take time out for frequent power cable failures. Wise mine superintendents know that the best protection against these ever-present, destruction agents is asbestos-insulated cable. That's why so many mines protect with Deltabeston Apparatus Cable.

Deltabeston Apparatus or Motor Lead Cable is designed for wiring low-voltage apparatus in mines, steel mills, power plants, refineries and other installations where severe operating conditions exist. See above how we fortify Deltabeston with extra protection against destructive agents.

* BUY WAR BONDS *

Deltabeston Asbestos-insulated Wires and Cables are distributed nationally by Graybar Electric Company, G-E Supply Corp. and other G-E Merchandise Distributors.

GENERAL ELECTRIC

1. Very soft, small copper strands — for greater flexibility and to withstand vibration.
2. Impregnated felted asbestos — for protection against overload heat.
3. Varnished cambric — for moisture resistance and high dielectric strength.
4. Felted asbestos — for extra protection against high ambient temperatures.
5. Asbestos braid — for high resistance to heat, moisture, oil and grease.



filed on behalf of the Commonwealth under mine safety laws and charges mining operations in a coal barrier left between two tracts for safety purposes.

P. & R. filed a new series of actions at Pottsville Jan. 19 against independent miners in Shenandoah and Brandonville.

Free-lance miners in the Minersville area alleging an aggregate weekly output of 7,000 tons announced Jan. 20 that they would work Sundays until the fuel shortage was lifted.

Coal Interests Would Invalidate Gas Line

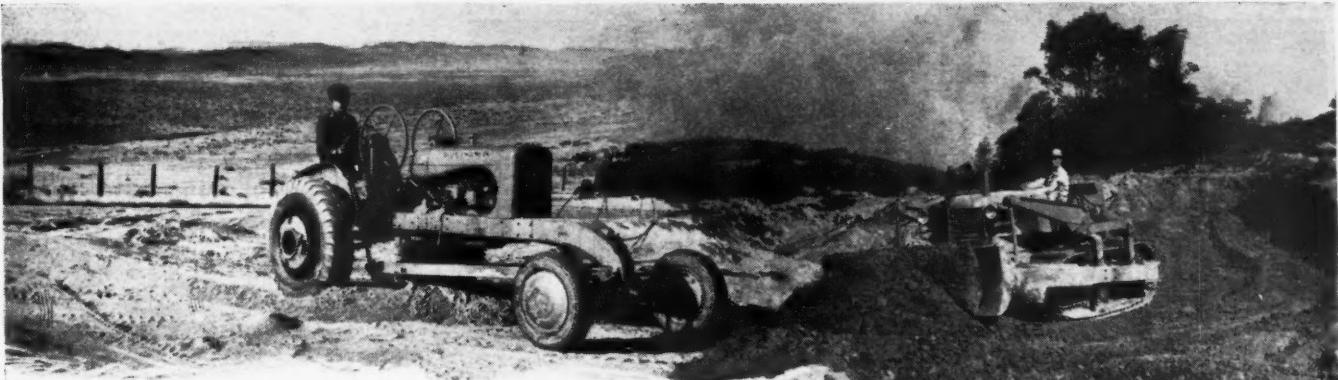
National Coal Association, Anthracite Institute, United Mine Workers and the Railway Executives' Association filed a petition in the U. S. Court of Appeals for the District of Columbia Jan. 13 asking review and invalidation of the action of the Federal Power Commission in granting a certificate for construction of a gas pipeline by the Tennessee Gas & Transmission Co. from Texas to West Virginia.

The appellants charged that the commission erred in its finding that it is not empowered to consider the social and economic effect of granting the certificate; that there was no competent evidence to support the findings and no legal or adequate basis for the order and the certificate, and that it erred in refusing to issue subpoenas to substantiate conclusions of government officials that the line must be built.

Counsel for the petitioners also wired

RED CROSS ASKS HELP

During March, designated by President Roosevelt as Red Cross month, the American Red Cross must raise its 1944 war fund—of unprecedented size to meet unprecedented needs. This year it must supply some 5,000,000 blood donations. Each month 2,500 nurses must be recruited for the Army and Navy. Red Cross field directors and other trained personnel must be stationed at military and naval posts and hospitals to help our fighting men and their families when personal trouble brews. At home the Red Cross must continue to maintain a state of alert. Disasters must be met as they occur. Nurse's aides and first aiders must be trained and other educational projects continued. Food parcels for distribution to prisoners of war must be packed, surgical dressings made and the thousand and one details of administering a far-flung, busy organization must be attended. All activities of the American Red Cross are financed by voluntary contributions. Let's give.



POWER THAT "DELIVERS"

.... on EVERY JOB!

Today's high speed mining schedules call for power that can deliver the highest possible output per hour of work; equipment that goes to work quickly, stays on the job and gets more done. Allis-Chalmers power fully meets these requirements. 2-Cycle Diesel tractors start instantly, work at high speeds, handle heavy loads with less gear shifting. 200-hour truck wheel lubrication saves on downtime — gives you extra man hours, more output per shift. These and other time and cost-saving features make them the choice of many miners rushing out essential ores.

Built to keep pace with the powerful, fast-moving 2-Cycle Diesel tractors are the numerous Allied manufacturers' units — like trailbuilders, bulldozers, scrapers, winches — all handled by your Allis-Chalmers dealer. He furnishes you with much of the power you need for your mining operations—for road building and maintenance, for cleaning-up, stripping, hauling heavy equipment and similar work. In addition, he offers you a complete line of A-C Power Units, widely known for their reliable, economical performance . . . for driving your conveyors, pumps, screens, air compressors, crushers, shovels, hoists and draglines.

See your Allis-Chalmers dealer about the availability of equipment for your needs. Fifteen percent of our crawler tractor production is released for essential civilian use. If

**you qualify under government regulations,
you can put the fast-working 2-Cycle Diesel
tractors to work now.**



ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE · U. S. A.

TRACTORS · ENGINES · ROAD MACHINERY

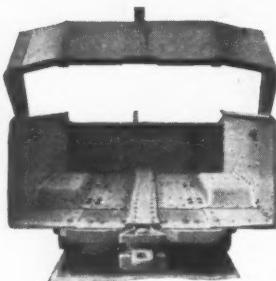


BRUTES FOR PUNISHMENT

**IN THE MINING
INDUSTRY**



Steelcar



Mechanical brutes for punishment,—designed to meet the gruelling service of the coal mining industry. Above ground or below, mine cars engineered by Pressed Steel Car have that built-in dependability that makes for better performance and longer life. Descriptive bulletin on request.

"Designers and builders of Railway Cars
Since 1898"



PRESSED STEEL CAR COMPANY, INC.
INDUSTRIAL DIVISION
PITTSBURGH, PA.

the chairman of the Texas Senate committee investigating the project in refutation of the contention of the pipeline officials that the coal and union interests had abandoned opposition when the war necessity of the pipeline was established.

The Anthracite Institute also petitioned FPC Dec. 29 for the right to intervene in protest against granting certificates to the Hope Natural Gas Co. and the New York State Natural Gas Corp. The latter involve construction and operation of 145 miles of 12½-in. pipeline from an existing compressor station in Wetzel County, West Virginia, across Greene County, Pennsylvania, to a point in Clarion County, Pennsylvania, where interconnection is proposed with an existing 12-in. line extending across Potter County, Pennsylvania, to New York State.

Personal Notes

H. D. CAUDILL, formerly with the Acorn Coal Co., Blackey, Ky., has been named general superintendent of the Carbon Glow Mining Co., Glow, Ky.

WALTER M. DAKE, formerly managing editor of Coal Age and Engineering and



Walter M. Dake

Mining Journal, has returned to the manufacturing field as president of Mining Machine Parts, Inc., Cleveland, Ohio.

W. H. FORBES, until lately in charge of the Denver (Colo.) health and safety office of the U. S. Bureau of Mines, has been engaged by the National Safety Council as industrial safety engineer to devote full time to the work of its Mining Section and the recently created Coal Mining Section.

HARRY HOBART HENDRY, for many years connected with the Appalachian Power Co., Welch, W. Va., has been made personnel manager of the Consolidation Coal Co., Jenkins, Ky. He succeeds J. S. FARINASH, who resigned to become labor commissioner of the Northern West Virginia Coal Association.

DAVID W. JONES, for the last seven years general superintendent of Kings Station mine, Princeton Mining Co., Princeton, Ind., resigned that position Jan. 1 to become associated with Paul Weir Co., mining engineers and geologists, Chicago.

Tim Malloy says... •

I work in a low seam and I'm glad that WHEAT provides a small battery so that we miners, who scramble around in low coal, don't have to carry a heavy lamp all day long.



THESE FEATURES MAKE WHEAT THE OUTSTANDING ELECTRIC CAP LAMP

1. Two bulbs (one for emergencies) — miner is never in the dark.
2. Headpiece weighs less than 6 ounces, Lamp Cord 6 ounces, Battery 62 ounces — Total weight of Lamp complete 74 ounces.
3. Headpiece molded of strong bakelite, sealed, moisture-proof and dust-proof.
4. Rubber battery case — non-conductor of electricity — a valuable safety feature.
5. Battery solution (free) limited to one ounce total both cells.
6. Lead-acid type battery maintains high voltage throughout shift (80 + percent efficiency) — year after year.
7. Battery charged through headpiece and cord of cap lamp — a daily test of all connections.
8. Designed for self-service charging system for lowest lamp-house operating cost.
9. To charge, headpiece is simply slipped on to key in charging rack, and turned to make contact. Nothing to take apart — unit-sealed construction.



W H E A T
The Approved Cap Lamp

Write today—

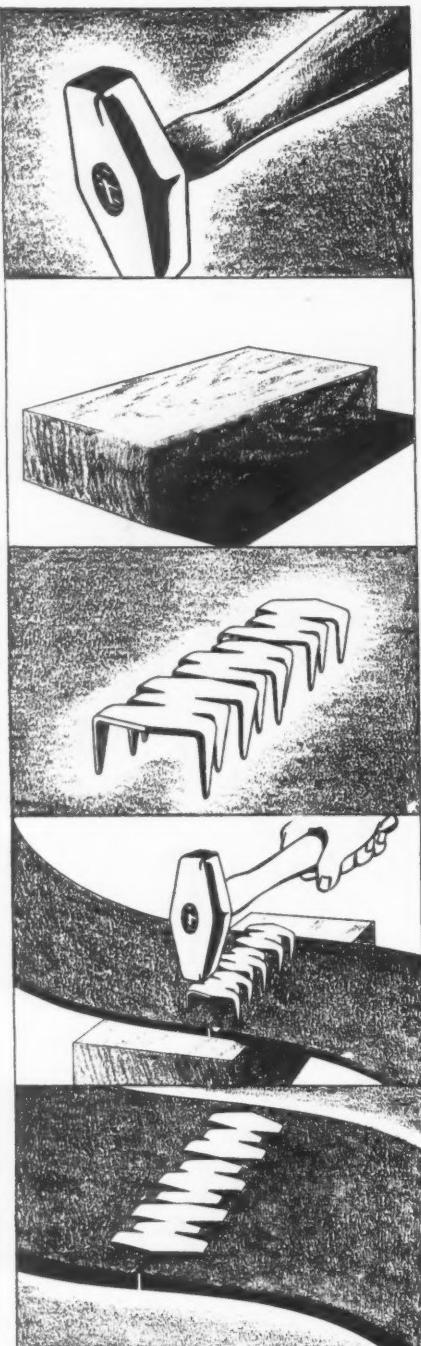
WHEAT LAMP SALES, INC.

1501 Kanawha Valley Bldg., Charleston, W. Va.

SPECIALISTS IN MINE
LIGHTING FOR 25 YEARS
KOehler MFG. CO.

Marlboro, Mass.





BRISTOL'S BELT FASTENERS

For leather, rubber or woven belts and conveyors—up to $1\frac{3}{16}$ ". Write for Bulletin 728A.

THE BRISTOL COMPANY
139 Bristol Road, Waterbury 91, Conn.
DISTRIBUTORS EVERYWHERE

For 15 years before his connection with the Princeton operation Mr. Jones was with the Valier Coal Co. as electrical engineer and general superintendent.

ALVIS H. MERCER has been named general manager of the Elk Horn Coal Corp., with mines at Fleming, Haymond and Hemphill, in the Elkhorn district of eastern Kentucky, succeeding I. S. Ramsey, deceased.

GEORGE H. SAMBROOK has been appointed safety director for the H. C. Frick Coke Co., Pittsburgh, Pa., and associated companies, effective Jan. 1, succeeding CLYDE L. LUTTON, retired as of Dec. 31. Mr. Lutton will be retained temporarily in an advisory capacity.

GLENN E. SORENSEN, superintendent of the Kemmerer Coal Co., Frontier, Wyo., has been named manager of both the Kemmerer company and the Gunn-Quealy Coal Co., Quealy, Wyo. With Kemmerer 16 years, he will manage three Kemmerer mines near Kemmerer and two Gunn-Quealy mines in the Rock Springs district.

New Mine Wages Set By British Tribunal

A new national minimum weekly wage for coal miners in Great Britain providing \$20 for underground workers and \$18 for surface employees was announced Jan. 22 by the national tribunal for the industry. This is an increase up to \$3.40 over the minimum set in 1940 but is less than the demand of the Miners' Federation for minimums of \$24 for underground men and \$22 for surface workers.

Special provisions are made in the new scale for trainees—youths drafted for the mines under the labor conscription law—and double rates are awarded for weekend work and bonuses for overtime.

Coal Deal Presages P.R.R. Expansion

Purchase of 2,669 acres of coal land in Croyle and Summerhill townships, Cambria County, Pennsylvania, at a cost of about \$515,000 was completed Dec. 31 by the Manor Real Estate & Trust Co., a subsidiary of the Pennsylvania R.R. The deal was seen as a step toward electrification of the company's main line between Harrisburg and Pittsburgh. The lines are already electrified between New York and Philadelphia, Philadelphia and Washington and Philadelphia and Harrisburg.

Plans are said to call for construction of a huge power plant at Willmore in Summerhill Township, Cambria County, to furnish at least a part of the power for the line and for digging a tunnel through Cresson Mountain, Cambria County, at the top of the Allegheny Mountains, to eliminate the steepest grade on the Pennsylvania's main line.

Koppers Coal Division, Eastern Gas & Fuel Associates, Pittsburgh, Pa., has been engaged tentatively to mine the coal in the Cambria County tracts, it was reported.

MAY WE HELP YOU SOLVE A "RECOVERY" PROBLEM



Our PILOT laboratory is well equipped and staffed to test, experimentally, the application of FLOTATION to your product. Famed throughout the world for its practical mill results in ore concentration—the principle is proving—with equal success—its adaptability to the non-metallic and the process industries.

AGITAIR FLOTATION MACHINE

Now applied to CEMENT
PHOSPHATE . . . MAGNESITE
FLUORSPAR . . . FELDSPAR
GRAPHITE . . . TALC
MICA . . . BARITE
SPODUMENE . . . COAL

Write us a summary of your special problem. We will gladly explain our laboratory and consultation service. No obligation on your part.

THE GALIGHER COMPANY
48 SOUTH SECOND EAST
SALT LAKE CITY, UTAH

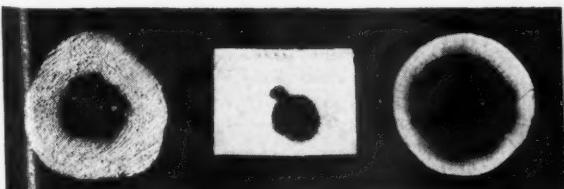
It's just as simple as it looks...



TREAT YOUR OWN TIMBER WITH OSMOSALTS

With Nature's Law of Osmosis doing most of the work, very little equipment is needed to treat mine timbers with OSMOSALTS. As the picture shows, only a wooden tank and a few pairs of tongs constitute both "plant and equipment." Add to this, any "available" labor, and you're ready to treat your own ... *Saving Time and Money in the bargain.*

More than one mine is today treating timbers with OSMOSALTS and obtaining, often from standing timber supplies on the property, dry, clean, odorless treated timbers which are safe to handle and fire retardant as well. Write today for all the facts.



Illustrated above are cross sections of three kinds of timbers. The white outer areas, which have been subjected to standard color reagent tests, show the deep penetration of the toxic chemicals in Osmosalts.

LOWER COST...

because you use native green timber.

LOWER COST...

because handling and transportation costs are greatly reduced.

LOWER COST...

because no special, expensive equipment or heating apparatus is needed.

LOWER COST...

because it can be applied with any unskilled labor.

OSMOSALTS

Nature's Method of Wood Preservation

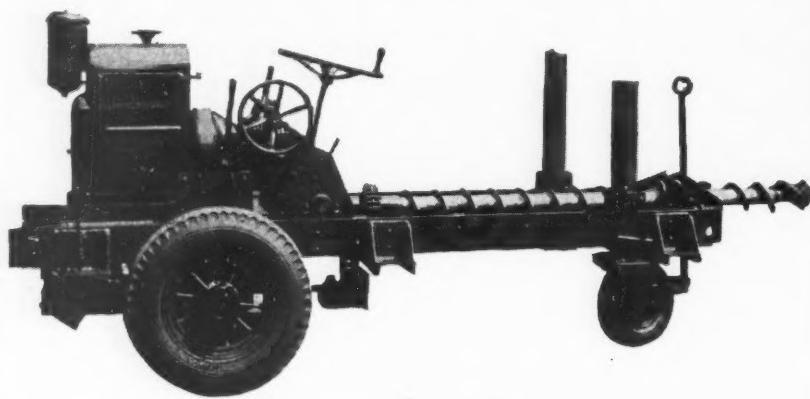
MANUFACTURED BY
OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.

GENERAL OFFICES: BUFFALO 12, N. Y.
BRANCH AND SALES OFFICES: BIRMINGHAM 3, ALA.; DENVER 2, COLO.;
KENOVA, W. VA.; HARLAN, KY.; MT. VERNON, ILL.

PARMANCO Horizontal Drills

"Positive Control Drilling"

Parmanco Horizontal Drills give you "Positive Control Drilling." Parmanco Vertical and Horizontal Drills are today's leaders in low cost, low maintenance drilling—All Parmanco Drills are equipped with patented Parmanco augers. Used by leading strip mine operators—Write us your drilling problems.



PARIS MANUFACTURING CO.
PARIS, ILLINOIS

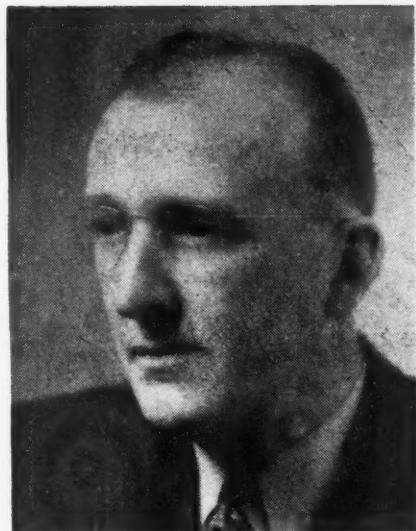
*Turns
Waste
into
Profits*

They may have been "eye sores" yesterday but, today, those tailing pond accumulations and culm banks are truly "a sight for sore eyes" to a nation trying hard to keep up a full head of steam for victory.

Numerous operators are finding that the most efficient way to turn these vital stores of "waste" coal into profits and power is by installing Plat-O Coal Washing Tables. One Plat-O Table can reclaim 15 or more tons of sizes down to $\frac{1}{4}$ " x 0 per hour. Better yet, one man can take care of as many as 20 tables because separation is automatic and in full view always.

Why not let Deister engineers show you how Plat-O Tables can convert coal dust into gold dust? Feel free to call on them today without obligation.

DEISTER MACHINE COMPANY
Fort Wayne 4, Indiana



Ralph R. Richart

Ralph R. Richart Joins Coal Age

Ralph R. Richart, formerly of the Allen & Garcia Co., Chicago, has joined Coal Age as assistant editor. The new editor, who is the son of Fred W. Richart, also a member of the Coal Age family, has had extensive experience as an electrical engineer, particularly in its relation to coal mining.

Receiving a B.S. degree in railway electrical engineering in 1927 at the University of Illinois, he took the General Electric test course and arc welding course (Schenectady, Erie and Philadelphia), 1927-9; was engaged on the electrification of the Cleveland Union Terminal Co., testing supervisory control boards in Philadelphia and installing them in the field, with one year of operation after construction work was completed, 1929-31; and received the professional degree of electrical engineer, University of Illinois, 1932.

He was electrical and mechanical supervisor, Seymour Coal Co., Herrin, Ill., 1933-6; electrical engineer, Kathleen mine, Union Colliery Co., Dowell, Ill., 1936-40; engaged in coal-briquetting research work, Illinois Geological Survey, Urbana, Ill., 1940-1; was civilian instructor in aircraft instruments, Air Corps Mechanics' School, Chanute Field, Rantoul, Ill., 1941-2; and joined Allen & Garcia Co., Chicago, as electrical engineer in 1942.

Anti-Strike Order Revoked in Canada

An order in council of Oct. 14, under which strikes and lockouts in Canada in connection with the mining of coal were specifically prohibited, has been revoked, it was announced Dec. 31. The revocation, said Humphrey Mitchell, Minister of Labor, was based on the fact that the situation now is covered by the revised wartime wage control order of Dec. 9 and that the specific order prohibiting strikes or lockouts in coal mines no longer is necessary.

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and co-
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metals
storage
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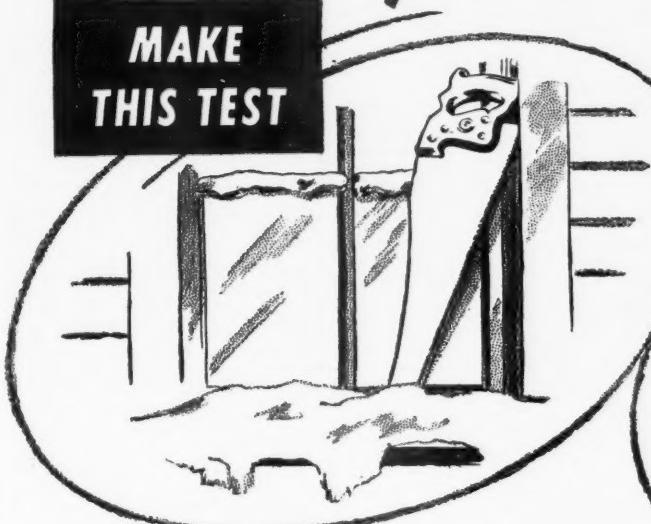
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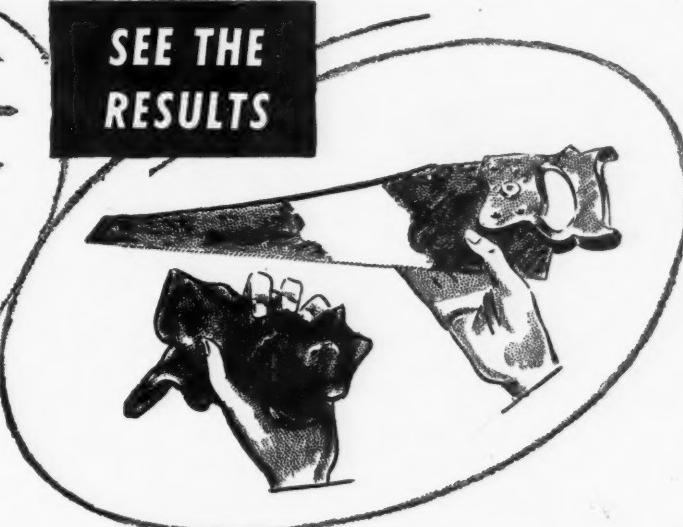
COAL A

How to prevent Corrosion

MAKE
THIS TEST



SEE THE
RESULTS



Coat a section of any piece of raw metal with a protective film of Anti-Corrodé. Place it outdoors, and leave exposed to the elements.

Rain, snow, changing temperature, dust and grime have eaten into and oxidized the unprotected metal. But note surface under Anti-Corrodé film—bright and unharmed, in its original state.

CITIES SERVICE ANTI-CORRODE is a safe rust and corrosion preventive that brings amazing results. It is a reliable safeguard against corrosion of metals in any form or state of finish—whether in storage or in transit. Anti-Corrodé forms a tenacious, durable film that is impervious to moisture and the more common gases prevalent in the atmosphere. And, since it contains lubricating material, it need not be removed in drawing operations. Anti-Corrodé is made in several grades to meet specific requirements and severest tests. It is economical, easy to apply and can be removed with kerosene or any petroleum solvent.

Take advantage of this FREE
ANTI-CORRODE demonstration offer
Mail this coupon today!

(Available only in Cities Service marketing territory EAST of the Rockies.)

This TEAM Will Save You Money and Materials

Recently, we announced the development of Cities Service Rust Remover, and responses to the demonstration offer far exceeded our expectations. Rust Remover, of course, removes rust. Anti-Corrodé is designed to prevent rust and corrosion. Together, they will safeguard your equipment and war production—for the duration!



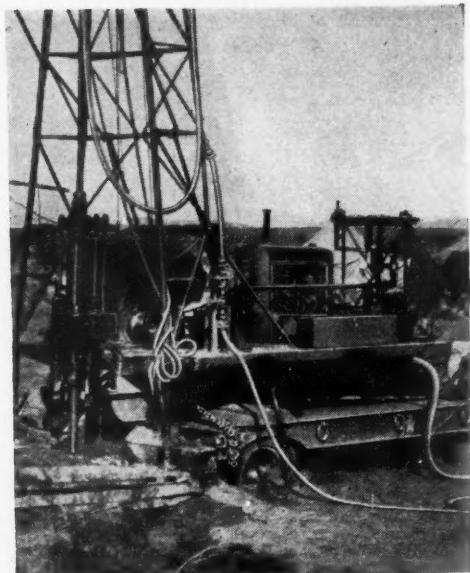
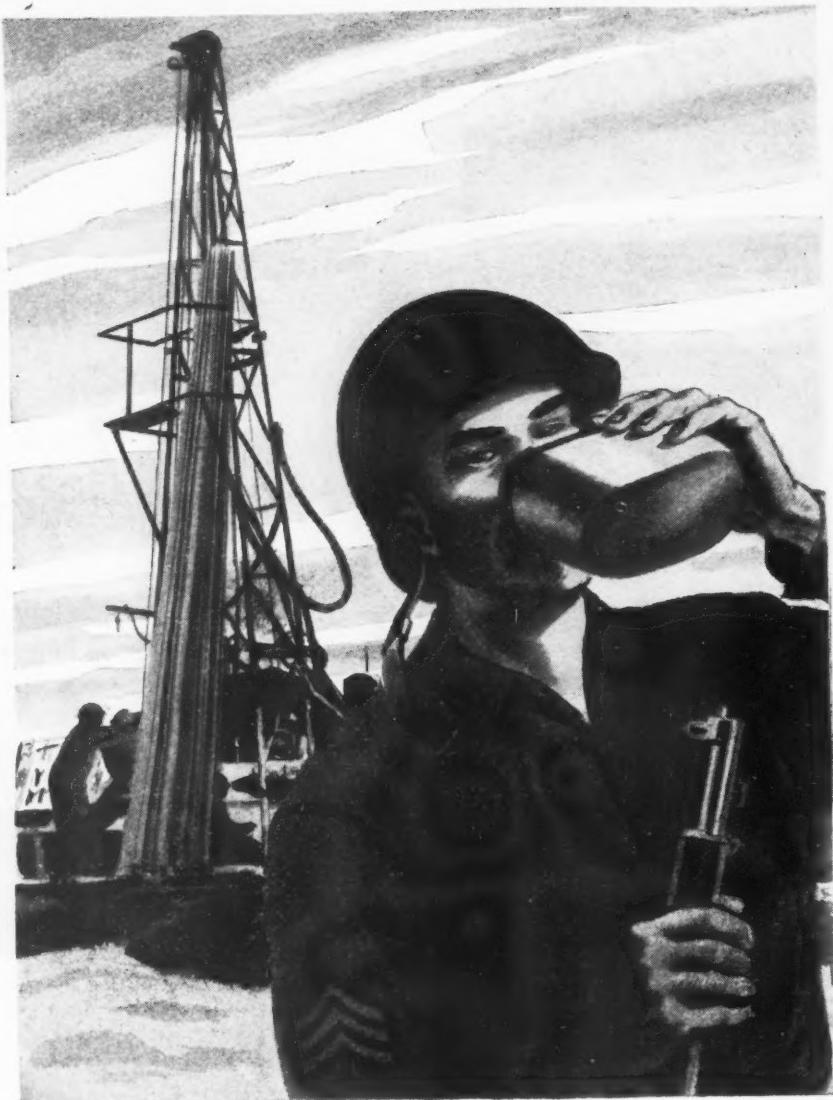
CITIES SERVICE OIL COMPANY
Room 124, Sixty Wall Tower, New York 5, New York
Gentlemen: I would like to test Anti-Corrodé on my own equipment FREE OF CHARGE. Please send me the details.

Name _____
Company _____
Address _____
City _____ State _____

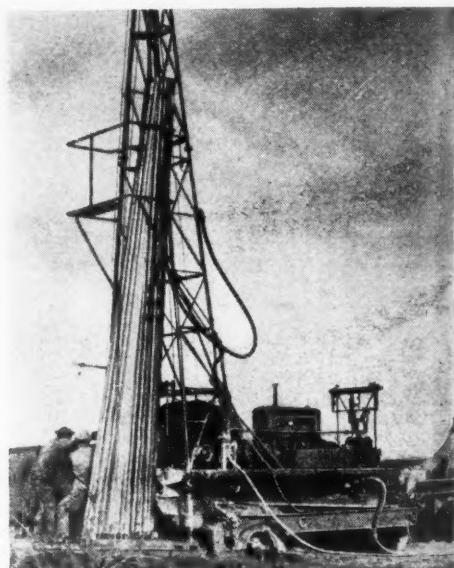


CITIES SERVICE OIL COMPANY
NEW YORK • CHICAGO

IN THE SOUTH
ARKANSAS FUEL OIL COMPANY
SHREVEPORT, LA.



THE HIGH-SPEED, PORTABLE DRILLING RIG is moved right up to the front lines by combat troops. The extremely flexible United States Rubber Company hose with which it is equipped is not only very strong but so much lighter weight than commercial hose made for similar purposes that there is a saving of several hundred pounds to be transported.



"But You've Got To Drill For It!"

Thirsty work—plowing across blazing desert—slogging through murky jungle—crouching in the rubble of blasted towns.

Wherever they are, our soldiers get plenty of fresh water to drink. When it isn't in sight or when what's in sight may not be safe—you've got to drill for it, deep underground.

With the Army on the move, maintaining an ample water supply, sometimes under fire, means drilling fast, whipping away to another sector, drilling again. A tough problem in equipment, that! But it's been licked—rubber helped.

The George E. Failing Supply Company of Enid, Oklahoma, in conjunction with the U. S. Army Corps of Engineers, designed the needed high-speed, portable drilling rig. Working with them, United States Rubber Company provided various types of special hose—rugged enough for this rough, tough service but extra lightweight to keep pounds at a minimum.

1230 Sixth Avenue • Rockefeller Center • New York 20, N. Y.



THE FIVE DISTINCT TYPES of United States Rubber Company hose supplied for the combat-zone drill rig are: high-pressure rotary hose; mud-suction hose, capable of being re-shaped if crushed; light, strong, wash-down water hose; high-pressure hose for hydraulic controls; oil suction hose for hydraulic system. These hose, as well as the special rubber valves, pistons and packings also supplied by the United States Rubber Company, are all specially designed to get water fast and to be tough for front line service.

United States Rubber Company engineers have aided many manufacturers in their problems of supplying articles of rubber for direct warfare use by the Armed Forces . . . as well as rubber equipment for plant production, safety and protection uses.

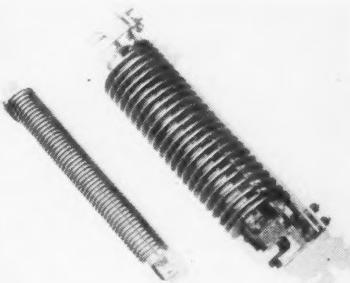
UNITED STATES RUBBER COMPANY

TIPS FROM MANUFACTURERS

Resistor Element

A new type resistor element is offered by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for use on open trolley mine and industrial locomotives. It has proved effective in service when applied to a number of locomotives ranging in size from 13 to 20 tons, the company states. The illustration shows the comparative size of the new type element and the smaller type. Although the new element does not supersede the smaller one for small locomotives, it is definitely recommended for heavy-duty haulage locomotives.

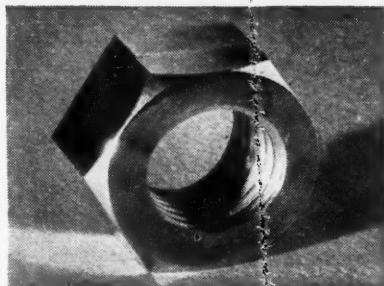
The fundamental design of this element assures satisfactory operation because, says the manufacturer, more resistor ca-



pacity can be provided in a given space; each element is large and the number per resistor and the number in multiple are reduced to a minimum, thus eliminating numerous connections and terminals and insuring more equal distribution of heating between elements; the large elements have relatively high thermal capacity; they are constructed in such manner that unusual electrical capacity is incorporated in the current-carrying parts; the element is mechanically strong; the frame of the individual element consists of a triangular metal spider which, because of its trusslike structure, prevents warping.

Stop Nut

Stover Lock Nut & Machinery Corp., Bushkill Drive, Easton, Pa., offers a new stop nut in which inherent elasticity of the steel in the wall is utilized to provide gripping action on the threads of a bolt. The gripping action is obtained by compressing the top of the nut against a taper-threaded, hardened steel mandrel. This makes the threaded section of the nut elliptical at the top and leaves the bottom round. When



the nut is applied it can be screwed on about half way by hand, but from there on a wrench must be used.

The nuts are similar in appearance to common nuts and have tolerances as prescribed for Class 3 fit. The gripping action is said to keep the nut from loosening under vibration, regardless of whether or not it bears on the work. No washers or other parts are needed. The nut can be used for repeated applications without substantially reducing the effectiveness of the gripping action or damaging the threads. The nuts are available at present in both U. S. standard and S.A.E. thread from $\frac{1}{4}$ -in. to $1\frac{1}{4}$ -in. bolt size in mild steel, alloy steel, brass and plated finishes.

Mine Jacks

To meet wartime conditions and reduce timbering costs per ton of coal mined, Templeton, Kenly & Co., Chicago, has introduced a new series of jacks, Simplex M9, 8-ton, and Simplex M17, 16-ton, round-pipe mine-roof jacks. By purchasing the screw assembly and base, these jacks can be universally used in mines having variable height seams, it is stated, merely by changing the length of stand-



ard-weight pipe used between the screw and base.

The M9 has a $1\frac{1}{4}$ -in. heat-treated screw for use with standard 2-in. pipe; M17, 1 $\frac{1}{8}$ -in. screw, 2-in. extra heavy pipe. Both models are furnished with lever nut or combination slide and drop handle and a strong base bolted through the pipe.

Sheave

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced its new "Magic-Grip" sheave, especially designed for quick and easy mounting and demounting. The sheave locks to shaft in one tightening operation. The manufacturer states the



new design permits the sheave to be mounted closer to the motor, increasing bearing life by reducing shaft overhang. The new grip assures smooth running performance free from backlash and shear.

Arc Welders

General Electric Co., Schenectady, N. Y., announces improvements in its line of direct-current single operator arc welders, Type WD-30 series. These welders are now equipped with two new control dials and a redesigned driving motor. The control dials permit the welding current to be preset without the aid of a voltmeter, and the driving motor is designed to give exceptional resistance to the weather when the welding machine is operated outdoors.

Large in size and conveniently located, one of the control dials is calibrated in terms of electrode size. The other dial indicates the range of welding current available for use under these conditions. The operator presets the welding current merely by rotating a pointer to whatever amperage he wishes to use.

Coal Production Depends on Haulage...



*Haulage depends
on Good Track!*

To help you "keep 'em rolling" we can assure PROMPT DELIVERY on a number of standard track equipment replacement parts—among them the Design 2 Special Frog shown above.

The West Virginia Rail Company announces the change of its corporate name to West Virginia Steel and Manufacturing Company. Broadening our line of manufactured products has made this change in name advisable. Increasing facilities will enable us to give even better service. There has been no change of personnel and there will be no change in our policy of endeavoring to maintain the same intimate helpful relationship with our customers.

WEST VIRGINIA STEEL & MFG. COMPANY

Formerly The West Virginia Rail Company

HUNTINGTON



WEST VIRGINIA

*For smooth,
quiet drives*

The continuous wedging action of the De Laval worm gear transmits power without vibration, shock or noise. • Three or more teeth are always in contact, resulting in an even flow of torque and great strength. • Both motor and driven machine are saved the impact of gear or sprocket teeth. Frequently the product is improved or the machine can be speeded up because of the absolutely uniform motion. Operatives do more and better work when not annoyed by noise and vibration. Describe requirements and ask for Publication W-1129.

specify
DE LAVAL
WORM GEARS



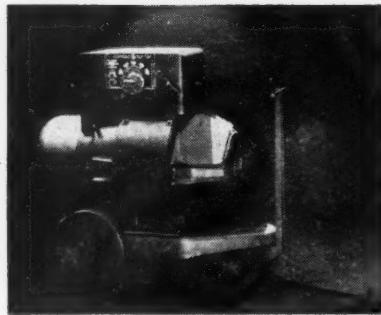
De Laval worm gear driving picking tables and loading booms in Morden Mine of the Kelly's Creek Colliery Co.

DE LAVAL

WORM GEAR DIVISION

of the De Laval Steam Turbine Co., Trenton, N. J.

MANUFACTURERS OF TURBINES STEAM HYDRAULIC PUMPS CENTRIFUGAL PROPELLER ROTARY DISPLACEMENT MOTOR MOUNTED MIXED FLOW EDDYLESS SELF PRIMING CENTRIFUGAL BLOWERS AND COMPRESSORS GEARS WORM HELICAL AND FLEXIBLE COUPLINGS



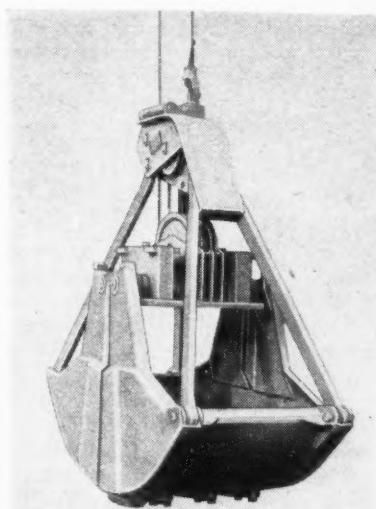
While basically the driving motor is the same as that previously furnished with these welders, it is equipped with heavier insulation and has special weather-protective features. The insulation of the motor windings is very heavy, and accelerated life tests show that this new insulation is far more resistant to deterioration from salt spray than the insulation previously furnished.

Photographic Printer

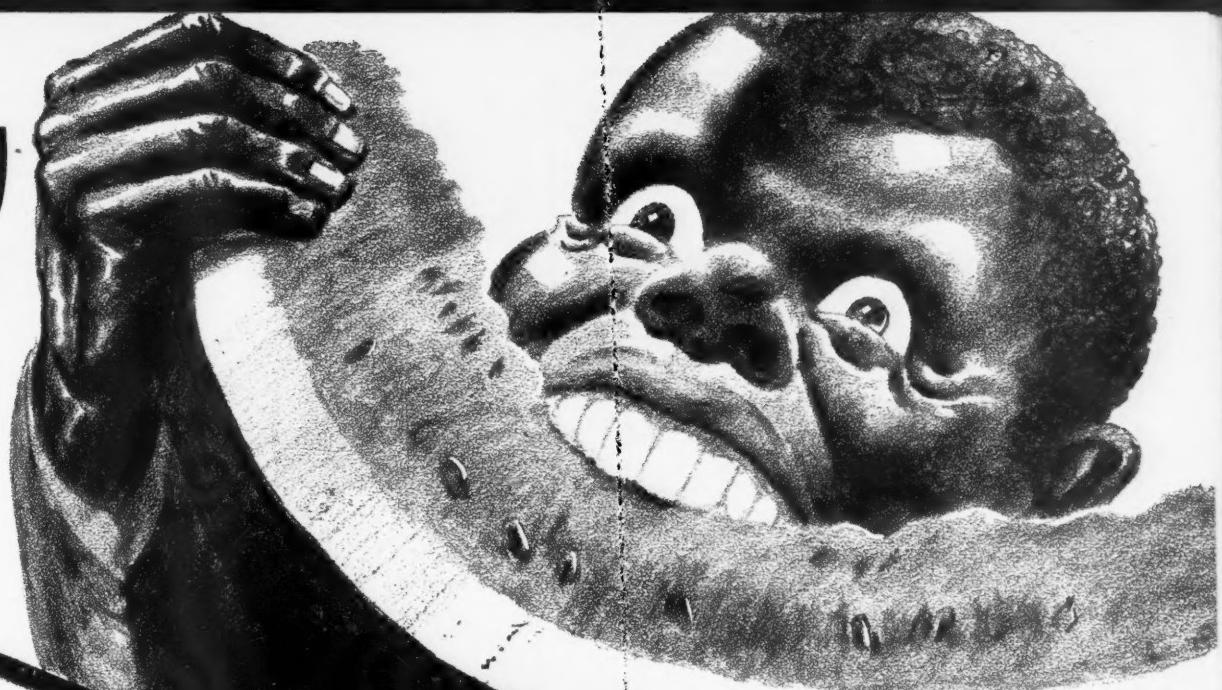
Charles Bruning Co., Inc., Chicago, has developed a new printer, Model 55C, for work with semi-photographic reproduction processes. The company says the printer will provide clear and faithful duplicates of anything typed, printed, photographed or drawn. The printer is 42 in., but requires floor space of only 40x62 in. and has a speed of from 0 to 18 ft. per minute. Electrical requirements are 4 amp., operating at 110 volts, and the machine is wired for 100 volts a.c., 60 cycles, or 220 volts d.c. According to the manufacturer, pencil tracings are quickly and easily intensified in reproduction and blue prints, layouts, maps and engineering data quickly and easily reproduced.

Clamshell Bucket

C. S. Johnson Co., Champaign, Ill., offers a new all welded clamshell bucket, one of the major operating advantages of which is a renewable manganese steel lip said to provide many times the wear of ordinary mild steel construction. Closing sheaves are equipped with needle bear-



it's the
EETH
that count



"COAL TEETH"—the Prox alloy tool steel precision hardened double point bits—put more bite in any mining machine.

The pressure for tonnage for Victory accelerates the trend from mine-sharpened bits to precision hardened tool steel factory bits. Mines are too busy mining coal to provide time and talent at the mine for bit sharpening, treating and handling, if those activities can all be dispensed with.

24 HOUR BIT SHIPMENTS

FRANK PROX COMPANY
INCORPORATED

TERRE HAUTE, INDIANA
1205 SOUTH FIRST STREET

... eliminate ventilation risks and increase production with

MOROPA COTTON BRATTICE CLOTH

This is no time to risk production losses through faulty ventilation . . . MOROPA COTTON BRATTICE CLOTH, as proved in the mines of many leading producers, is the soundest choice for the safety that allows you to boost vital production.

A careful examination of MOROPA'S characteristics reveals the reasons for its acceptance. MOROPA is Flame-Resistant, has low Porosity, Resists Mildew, and gives Maximum Wear.

See data on MOROPA, page 123 of the 1943 Coal Mining Catalog . . . or write us!

MOROPA comes in standard widths up to 84 inches.

Act today to eliminate unnecessary ventilation risks . . . install MOROPA.



... made in America,
of American Cotton,
manufactured by . . .

JOHN FLOCKER & COMPANY

642 GRANT ST.

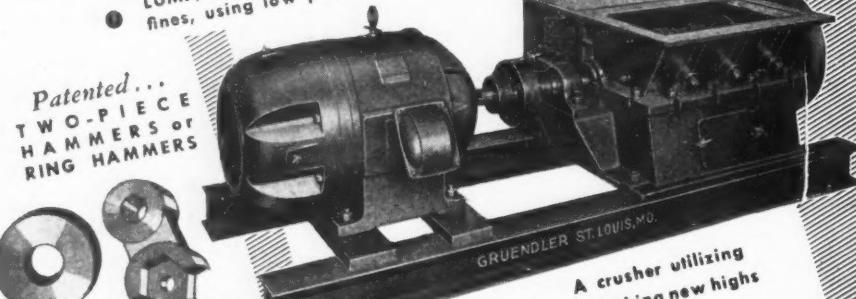
EST. 1822

PITTSBURGH, PA.

**GRUENDLER CRAFTSMANSHIP . . .
Employed by Coal Producers**

SPECIFIC SIZES of COAL

LUMP, EGG, NUT or STOKER SIZES produced with a minimum of fines, using low power by the GRUENDLER CRUSHER method.



Patented . . .
TWO-PIECE
HAMMERS OR
RING HAMMERS

Ring Hammer

Two-Piece Hammer

A crusher utilizing
small space and accomplishing new highs
in coal production.

GRUENDLER builds a complete line of coal
crushing equipment includes both single and
double roll crushers. Bulletins sent on request.

GRUENDLER
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Try the
"Blow-Torch Test"

ings protected against dirt and moisture by a special synthetic rubber seal. To prolong rope life, sheaves are of larger diameter and guide sheaves have been substituted for guide rollers.

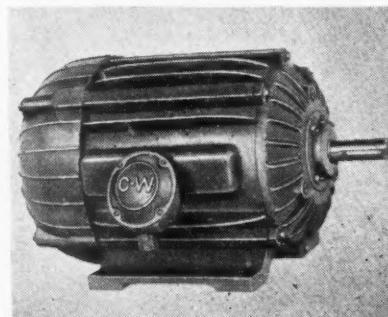
All-welded construction makes digging easy and fast, as there are no external bolt heads or rivets to slow up the operation. The welded design also permits great stability, since the weight can be exactly distributed.

Subject to required government authorization, general-purpose buckets are available for immediate delivery in the following sizes; $\frac{1}{2}$ to $2\frac{1}{2}$ yd.; rehandling buckets, $\frac{1}{2}$ to $2\frac{1}{2}$ yd.; heavy digging, $\frac{1}{2}$ to $1\frac{1}{2}$ yd.

Motor

Crocker-Wheeler division, Joshua Hendy Iron Works, Ampere, N. J., offers a "sealed-power," corrosion-resistant motor. Available in sizes from 1 to 15 hp., the new motor can be furnished for operation from any polyphase power supply.

This unit is of the totally inclosed fan-cooled type, but the design departs from previous models in that there are no cooling ducts to become fouled with wet or sticky dusts. All exposed parts of the cor-



rosion-resistant model are designed to be acid- and alkaline-resistant to a high degree. In addition to the mechanical sealing of the entire motor each coil is individually sealed against moisture, fumes, vapor and dust by the vacuum impregnation process.

File

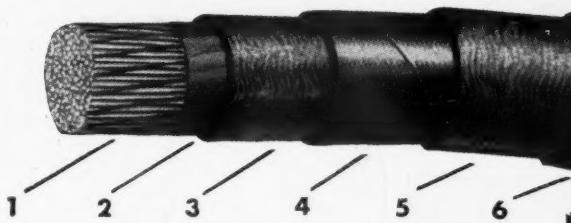
Kennametal, Inc., 120 Lloyd Ave., Latrobe, Pa., offers a new type file made of the same hard, high strength cemented carbide compositions as steel cutting Kennametal lathe and boring tools. According to the manufacturer, lathes have been "revved up" to the speeds necessary for efficient, enduring performance of carbide-tipped cutting tools, and the ability to file revolving work pieces without reducing speed is a valuable aid to maintenance of production.

Service trials, says the company, demonstrate that the new file will cut steels of a hardness up to 62 Rockwell C. and does a noteworthy job on cast iron and brass at surface speeds around 900 ft. per minute. High-carbon, high-chromium steels have been filed at 800 s.f.m., with the files still in good condition after three weeks of use.

This file is available in one size, called

**There is
NO TIME TO WASTE
in Repair Shops . . .**

**WIRE MINING EQUIPMENT WITH
ROCKBESTOS A.V.C. MINING CABLE**



One sure way to keep cutters, loaders and locomotives from wasting time in repair shops waiting for rewiring jobs . . . is to wire with Rockbestos A.V.C. Mining Cable. This tough, long-lived cable has a permanent, impregnated asbestos insulation that is heatproof, fireproof, and even capable of withstanding conductor-heating overloads up to the melting point of copper without igniting or burning.

This permanently insulated cable won't bake brittle, crack, bloom, swell, flow or rot and is resistant to oil, grease and alkalies. Send for a sample, put it through the severest tests, and see for yourself how Rockbestos A.V.C. Mining Cable keeps mining equipment up at the face producing for VICTORY.

ROCKBESTOS PRODUCTS CORPORATION
P. O. Box 1102, New Haven 4, Connecticut

ROCKBESTOS A.V.C.
The Cable with
Permanent Insulation

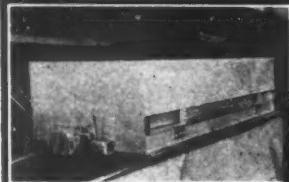
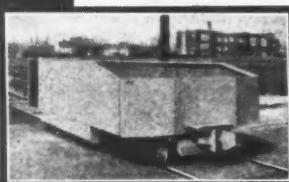
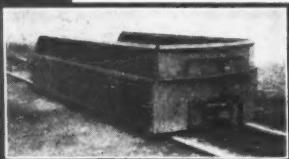
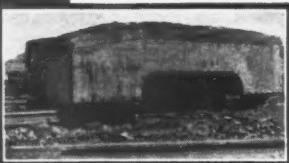
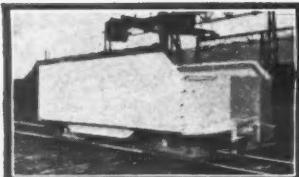
ORDER FROM THESE JOBBERS—SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.: Beckley Mach. & Elec. Co.
BIRMINGHAM, ALA.: Moore-Handley Hdwe. Co.
BLUFFFIELD, W. VA.: Superior-Sterling Co.
CLEVELAND, OHIO: Upson-Walton Co.

EVANSVILLE, IND.: Evansville Elec. & Mfg. Co.
FAIRMONT, W. VA.: Fairmont Supply Co.
HUNTINGTON, W. VA.: Banks-Miller Supply Co.
LOTHAIR, KY.: Mine Service Co.

MIDDLESBORO, KY.: Rogan & Rogan Co.
PITTSBURGH, PA.: Upson-Walton Co.
Westinghouse Elec. Supply Co.
SCRANTON, PA.: Penn. Elec. Engineering Co.
WILLIAMSON, W. VA.: Williamson Supply Co.

FOR VICTORY—GET OUT COAL and INVEST IN U. S. WAR BONDS



More Coal per Day At Less Cost per Ton

This has been accomplished at many mines where cars are equipped with Willison Automatic Couplers.

For rapid and safe handling of larger capacity cars used in modern mechanized mines, the Willison Automatic Coupler is the answer.

The Willison Automatic Coupler offers many advantages including:

Safety in operation—It is not necessary to go between the cars.

Faster shunting and gathering of cars—Automatic coupling saves time.

Less spillage of coal—Smooth operation of train reduces surging and car derailments.

Operates satisfactorily through all kinds of dumps—No uncoupling in rotary dump.



There's a Willison for every type of car.

NATIONAL MALLEABLE & STEEL CASTINGS CO.
CLEVELAND OHIO

You are one of over 12,000 subscribers of Coal Age

Your problems of mine management, production, or operation—whether business or individual—are duplicated with other readers, but—

Still other readers can provide the solution of your problem if they know what it is! Tell them! Here!

Through classified advertising in the Searchlight Section of COAL AGE—your business paper and theirs.

Our laboratory rigidly controls every ingredient going into *Superior* brushes and every manufacturing step. Each successive process must be approved by frequent sampling before the next step is taken. *Superior* engineers then follow into the field, study brush performance under actual operating conditions, and get the user's angle. All this makes for uniform quality.



A well manned, well equipped laboratory controls every phase of SUPERIOR materials and workmanship.

Ask for
Catalog No. 7

*Accurate
LABORATORY
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 **SUPERIOR** CARBON
BRUSHES

SUPERIOR CARBON
PRODUCTS, INC.
9111 George Ave., Cleveland 5

the F76. It is 11 in. long, $\frac{3}{8}$ in. wide and $\frac{1}{8}$ in. thick having a substantial filing surface 4 in. long, single cut with teeth at 30 deg. shear angle, 40 per inch. Convenient grips for the operator's hands are provided.

Electrode

A new general-purpose arc-welding electrode for welding mild steel in all positions, with either alternating or direct current, is offered by the Lincoln Electric Co., Cleveland, Ohio. Named "Fleetweld 37," the new electrode was originally designed as an easy striking, unusually smooth operating electrode primarily for light-gage material. Extensive use in production is said to have shown it to be a very fast operating electrode under all conditions.

A feature of the new electrode is that there is said to be absolutely no slag interference when welding vertical down. Its ability to withstand high currents makes possible high welding speeds and its easy handling characteristics in all positions make it suitable for general-purpose work. The fact that with proper currents it will neither stick to the work nor burn through makes the electrode especially desirable for light-gage welding. The new electrode is available in $\frac{1}{8}$, $\frac{5}{32}$ - and $\frac{3}{16}$ -in. sizes in 14-in. lengths and is packed in 50-lb. standard containers.

Welders

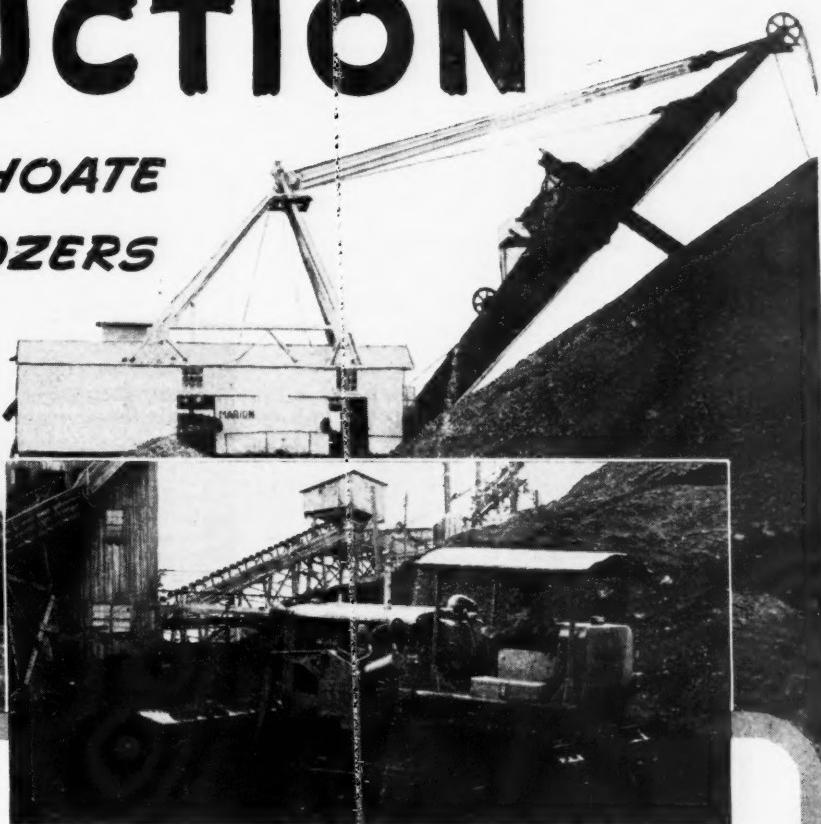
Wilson Welder & Metals Co., Inc., 60 West 42d St., New York City, announces that Wilson "Bumblebee" arc welders are now available in all-weather models of 300- and 500-amp. capacities. These machines are similar to the standard Wilson "Bumblebee" a.c. welders, except that they have special moistureproof insulation throughout and all parts are protected by a heavy coating of moistureproof paint. The outer case is finished in a durable weather-resisting enamel and has gaskets and louvers designed to prevent entrance of rain.

In addition, the new models are equipped with low-voltage contactors which automatically hold the open circuit voltage at approximately 40. When the operator strikes the arc, the low-voltage contactor closes instantly and the transformer's per-

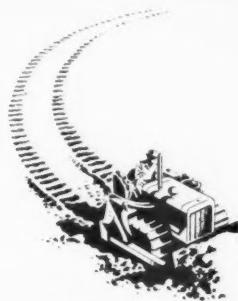


INCREASE PRODUCTION

with LA PLANT-CHOATE
HYDRAULIC DOZERS



Above: This dozer is building a new road to a box cut in a new section of the mine. Right: After this culm is dumped in large piles, it is bulldozed into hoppers and conveyed to the washer for reclaiming.



SAVE MANPOWER SAVE MAN HOURS

Job studies reveal that one good operator with a LaPlant-Choate hydraulic dozer can move more material—and move it faster—than a whole gang of men. This is especially true in hard digging because LaPlant-Choate hydraulic dozers give you the extra "down-pressure" you need, plus the ability to hold your blade in a rigid position at all times. And remember, LaPlant-Choate dozers—both cable and hydraulic—are engineered to fit all sizes of "Caterpillar"-built tractors.

In the present emergency, mine operators everywhere are discovering that many time-consuming jobs—formerly done by hand—can be finished faster, cheaper, better with LaPlant-Choate hydraulic dozers. In scores of mines, these sturdy versatile machines are keeping busy 'round the clock—building access and delivery roads . . . moving and leveling . . . cleaning up around shovels . . . reclaiming culm banks . . . cleaning off coal veins . . . and heavens knows what not. If you are not already acquainted with all the jobs a dozer can do to speed production and cut costs, see your nearest LaPlant-Choate—"Caterpillar" distributor, or write: LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.



LA PLANT-CHOATE
Earthmoving and Land Clearing Equipment



Specify

NOT JUST ORDINARY
BEARINGS and BUSHINGS

Matching the formulae to the application, Promet brings you the right bearing or bushing for every requirement.

Parts for Jeffrey, Goodman, Westinghouse, General Electric, Sullivan, and Joy Equipment, etc.

Pioneers in Superior High Lead Bronzes and Alloys.

Machinists Prefer PROMET

BAR STOCK . . . CORED OR SOLID because it machines easily. Rounds, Hexagons, and Squares, in rough cast, semi-finished, or fully machined.

Cored bar stock available in all sizes (by $\frac{1}{8}$ " steps) from a $\frac{1}{2}$ " minimum core to 12" O.D. and 12" lengths.

PROMET BRONZE FORMULAE NO. 1—for light pressures at all speeds. Particularly useful in connection with high temperatures and faulty lubrication.

PROMET BRONZE FORMULAE NO. 18—for medium pressures at all speeds. A general all-around all-duty lubricating bronze with a large factor of safety.

PROMET BRONZE FORMULAE NO. 6—for heavy pressures at all speeds. Especially adapted to all heavy duty bearings.

PROMET BRONZE FORMULAE NO. 89-S—for extra heavy duty and shock loads at medium to low speeds. Meets all exacting requirements demanding high strength and hardness.

Write today for details

THE AMERICAN CRUCIBLE PRODUCTS CO.

Prompt deliveries can be made from stocks maintained at

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The Universal Supply Co.,
Corner 2nd Ave. and
2nd St. Phone 3642

LORAIN, OHIO,
The American Crucible
Products Co. Phone 6983

WILLIAMSON, W. VA.,
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Other Representatives

BIG STONE GAP, VIRGINIA . . . C. P. Cawood
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lawn Ave. Phone Pittsburgh 9876

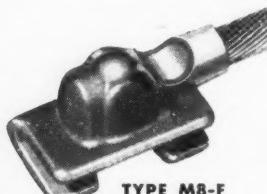
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Frank E. Rhine,
623 Blair Ave. . . . Phone Alton 3-8624

1307 OBERLIN AVE.
LORAIN, OHIO, U. S. A.

Mesco Rail Bonds
for
LOWER RESISTANCE
ON YOUR
HAULAGE ROADS

The Mosebach patented process of welding insures an absolute connection between the end of each individual wire in the copper cable and the forged steel terminal. The flow of power is no greater than the weakest section in the circuit. Decreased resistance means greater conductivity and longer bond life which affords maximum production on your haulage road.

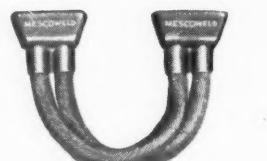
Mosebach Rail Bonds are manufactured in 18 different styles. An efficient style is available for every bonding requirement. Better bonds mean better service; specify Mosebach Rail Bonds — your most efficient link between power and profits. Write for complete details.



TYPE M8-F



TYPE M9-F



TYPE M10-F



TYPE M5-F

formance thereafter equals that of machines not similarly equipped. When the arc is extinguished, this device immediately reduces the voltage back to 40.

Hose Clamps

The industrial products sales division, B. F. Goodrich Co., Akron, Ohio, has been granted national distribution rights of the Punch-Lok hose clamp and method of applying it to hose of all types, electric cable, and wire or textile rope. The clamp is a mechanical device used to connect various kinds of male and female fittings, special nipples, menders or ordinary pipe to a hose. Once the Punch-Lok hose clamp has been locked, it is said that vibration or rough handling will not loosen it. Clamps up to 48 in. in diameter can be applied with the portable tool weighing only 2½ lb.

Dust Collector

Pangborn Corp., Hagerstown, Md., offers a new industrial-type "CK" unit dust collector. Self-contained and occupying minimum floor space, it has two-stage separation designed to reduce filter surface wear to a minimum. It is available in three sizes with capacities to 1,000, 2,000 and 3,000 c.f.m. and is said to be flexible in arrangement to permit adaptation to a variety of field conditions.

It has a screen-cleaning mechanism; is easily accessible for inspection, servicing and adjustment, and is said to require no attention except the shaking of screens and removal of dust from a single point at regular intervals.

Industrial Notes

VULCAN IRON WORKS, Wilkes-Barre, Pa., announces election of a new president, Edmund J. McSweeney, formerly superintendent of all motive power of the Baltimore & Ohio R.R. at Baltimore and for the last year in charge of the locomotive transportation program for the War Department under Maj. Gen. Charles P. Gross of the Army Service Command. He succeeds E. Perry Holder, who resigned several months ago to become president of Wickwire Spencer Steel Co. George H. Brown, assistant secretary and connected with Vulcan for 52 years, and William E. Willingale, assistant treasurer, have retired.

NATIONAL BATTERY CO., with general offices in St. Paul, Minn., has acquired its tenth plant, in Zanesville, Ohio. The new structure has 90,000 sq.ft. of floor space, all of which will be devoted, for the duration of the present wartime emergency, to the manufacture of batteries for Army and Navy use. Post-war plans provide for conversion of the plant to automotive battery production.

OHIO BRASS CO., Mansfield (Ohio) division, received the Army-Navy "E" award Jan. 6.

ELECTRIC STORAGE BATTERY CO., Philadelphia, Pa., has assigned to Roland

MOSEBACH
ELECTRIC & SUPPLY COMPANY
1115 Arlington Avenue Pittsburgh, Pa.

BOWDIL COAL CUTTING EQUIPMENT

Watch your costs come down!



To increase your tonnage output and at the same time reduce costs, specify BOWDIL—the finest in coal cutting equipment.

Illustrated is the BOWDIL Concave Cutter Bit . . . a patented design, embodying these advantages:

Reduced Power Requirements (The thin design and concave form provides greater clearance . . . cuts more coal faster with 15% to 20% less power)

Thinner Kerf (Here again advantages of the compact construction of the Bit are illustrated. Because of the thin design 25% to 30% coarser cuttings result and service life of the bit is increased 3 to 5 times.)

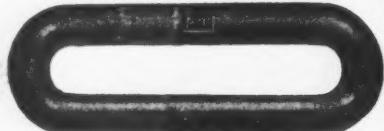
Write today for complete information on the BOWDIL combination—Bar, Chain and Bit. Engineering service is available to help you solve your coal cutting problems.



ASK THE BOWDIL
SALES ENGINEER TO
SHOW YOU COST-
CUTTING EXAMPLES

THE BOWDIL COMPANY • CANTON • OHIO

FOR SAFETY'S SAKE, SUPERIOR COUPLINGS



Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS



PITTSBURGH KNIFE & FORGE CO.

716 Chateau Street
N. S., Pittsburgh, Pa.



Whitehurst, hitherto assistant sales manager, the title of sales manager, effective Jan. 1. He has been in the employ of the company since 1908 and was manager of its Washington branch for 20 years.

CONTINENTAL GIN Co.'s plant in Birmingham, Ala., has been granted a fourth Army-Navy "E" award for meritorious service on the production front.

AMERICAN WIRE FABRICS CORP., Mt. Wolf, Pa., has elected George H. Creveling treasurer and Franklin Berwin secretary.

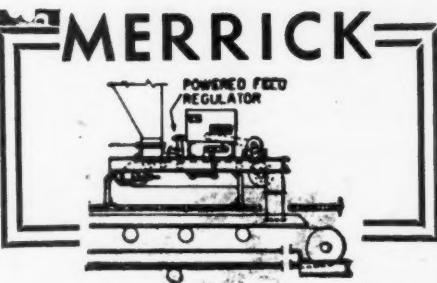
WESTINGHOUSE ELECTRIC & MFG CO., East Pittsburgh, Pa., has named Leon R. Ludwig, formerly head of the company's circuit breaker and protective devices division, as manager of the motor division. Holder of more than a score of patents, Mr. Ludwig worked with Dr. Joseph Slepian, associate director of the Westinghouse Research Laboratories, to develop the Ignitron, a power tube which converts alternating current into direct current. He succeeds R. W. Owens, resigned. James H. Jewell is new assistant manager of industry departments, but will continue as manager of the agency and specialties department. William J. Massey has been appointed general lamp sales manager of the Westinghouse Lamp Division with headquarters at Bloomfield, N. J.

B. F. GOODRICH CO., Akron, Ohio, announced it would establish manufacturing operations in DuBois, Pa., early in January. The new production unit will manufacture products in which rubber and textiles are employed, according to company officials. A. J. Baker, manager of Akron factory employment, is plant manager in DuBois. The company recently announced decision to build a new tire manufacturing plant in Miami, Okla., and construction work was scheduled to start in January. B. F. Stauffer has been elected as president and general manager of American Anode, Inc., succeeding Raymond W. Albright. Mr. Stauffer has been with Goodrich since 1893, serving in various capacities, most recent of which was assistant general manager of the industrial products sales division.

LINK-BELT CO., Chicago, has elected two new vice-presidents, E. L. Berry and Richard F. Bergmann. Mr. Berry was formerly vice-president and general manager, Link-Belt Ordnance Co., and Mr. Bergmann was formerly company chief engineer. The company also announced that John E. Martin had been named manager of Link-Belt Ordnance.

MARION STEAM SHOVEL CO., Marion, Ohio, has appointed Walter N. Westland as sales manager. A graduate of Massachusetts Institute of Technology, Mr. Westland has been with the company since 1925. The company also has appointed L. C. Mosley as manager of the mining division to fill the position left vacant by the death of Homer Littlefield. Mr. Mosley joined the company in 1925, having been associated previously with the General Electric Co.

CARDOX CORP., Chicago announces that



MERRICK FEEDOWEIGHT

*Accurately Feeds
and Records by Weight*

Look into this method of feeding coal to a mixing conveyor.

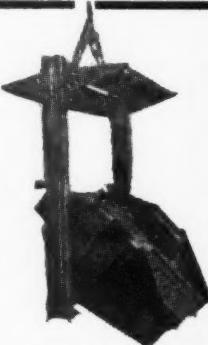
A powered feed regulator controls the feed gate. A visible balance indicator shows true balance for correct rate of feed, while the weight totalizer keeps an accurate record of the day's tonnage.

Investigate this sturdy, dependable equipment for controlling and recording by weight.

Write for Bulletin 551.

Merrick Scale Mfg. Co.
Passaic, N. J.

SELF-DUMPING CAGES



• Designed to meet demand for an automatic cage to complete a faster hoisting cycle as the result of over sixty years' experience manufacturing cages in the coal mining field. In addition to Self-Dumping Cages which hold the world's record for capacity, special types are furnished to fit individual needs. Write for information on Olson Non-Dumping Platform Cages or other material cages for use in air shafts.

Inquire about the small, low-cost Eagle Stoker Coal Crusher

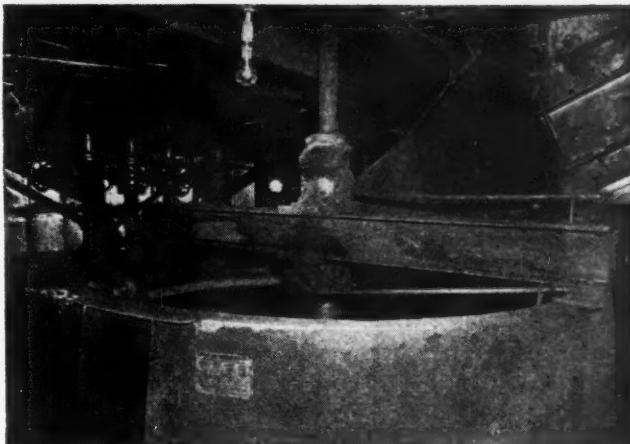
Eagle IRON WORKS
DES MOINES, IOWA
Established 1872

More Profit— ... From COST of PREPARATION!

- When low cost operation has been designed and engineered into your Preparation Plant, you will be better equipped to compete probably in markets for premium coals.

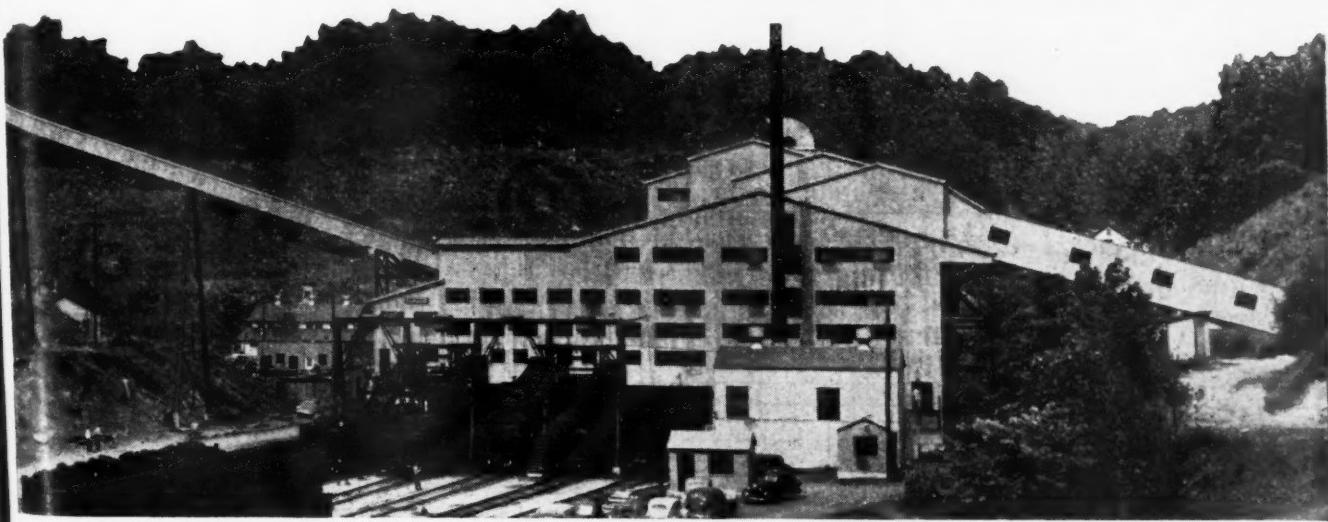
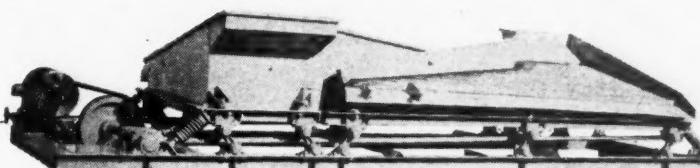
The future for coal is bright . . . improved combustion equipment in domestic and industrial markets . . . new uses for coal in many hitherto unheard of fields will increase, and in many cases make imperative, scientific preparation of coal.

FAIRMONT has both the organization and the experience to design, engineer and erect a new plant to meet the most exacting and expanded preparation requirements—or rejuvenate your present plant—and to consult with you as to the method best suited to your particular coal, always with lower operating cost in mind.



Installation View—Chance Cone for Wet Cleaning Coal.

Bottom Illustration—Twin-dex American Pneumatic Separator for dry cleaning coal.



TRADE MARK REGISTERED

FAIRMONT MACHINERY COMPANY
FAIRMONT, W. VA.

Dr. Charles A. Getz, director of its research division, has been elected to fill the newly created position of vice president in charge of research.

CATERPILLAR TRACTOR CO., Peoria, Ill., has appointed Kenneth F. Park to the management of the sales development division. He has been associated with the heavy machinery business in the capacity of earth-mover or equipment man since 1926.

WEIRTON STEEL CO., a subsidiary of National Steel Corp., announces the following changes in its executive organization: E. J. Anglin has resigned as vice president in charge of operations but will continue as general consultant. Mr. Anglin has been succeeded as vice president in charge of operations by J. S. Williamson, former general superintendent. E. W. Rieger, former assistant to the president, has been appointed vice president in charge of engineering and development work. W. A. Murphy has been appointed vice president and also will continue to serve in the capacity of secretary. J. J. Munns has been appointed vice president in charge of quality control. C. E. Bayer, former manager of the steel works department, has been appointed general superintendent, and E. O. Burgham, former manager of the Weirton tin mill, has been appointed assistant general superintendent. Other appointments include P. R. Church, formerly assistant, as manager of the steel

works department, and C. E. Carr, former assistant to the manager, as assistant manager of that department. A. E. Kadell, former manager of the Steubenville tin mill, has been named as manager of the Weirton tin mill, and C. M. Eddy, who was assistant manager of the Weirton tin mill, has been appointed manager of the Steubenville tin mill. J. D. Gold, former chief metallurgist, is appointed vice president in charge of quality control and its supplemental departments. S. M. Newbrander, former first assistant metallurgist, succeeds J. D. Gold as chief metallurgist.

STEARNS MAGNETIC MFG. CO., Milwaukee, Wis., announces that Harold W. Buus has returned to his former position as supervisor of technical operations. He was with the firm several years ago, when he was granted a leave of absence to take charge of the magnetic separations division of a prominent western mining operation.

NATIONAL BATTERY CO., St. Paul, Minn., has appointed W. C. Shull as manager of national account sales. He succeeds J. C. Hammond, who leaves the battery industry to become sales manager of the Franklin Transformer Mfg. Co.

TIMKEN ROLLER BEARING CO., Canton, Ohio, announces that A. M. Donze, factory manager for the last eight years, has become vice-president in charge of production. H. M. Richey, assistant factory man-

ager, has been promoted to factory manager. Walter G. Hildorf was recently made director of metallurgy, a newly created office. He formerly was chief metallurgical engineer, a position now held by Ralph L. Wilson. John E. Fick, superintendent of the Steel and Tube division, has been named vice-president in charge of the division. E. S. Hoopes, Jr., assistant general superintendent, has been advanced to general superintendent of the Steel and Tube division.

MACK INTERNATIONAL MOTOR TRUCK CORP., New York City, has appointed Henry Rowold as vice-president. He joined the Mack organization in 1919 in a clerical capacity and later became executive assistant to the president. He was placed in charge of national account sales in 1939, and as vice-president will continue in that capacity.

BARBERTON (Ohio) plant of the Babcock & Wilcox Co. has been awarded a new Army-Navy "E" pennant with three stars affixed.

B. F. GOODRICH CO. has appointed Edward H. Fitch merchandise manager of the combined automotive, aviation and government sales division. Mr. Fitch has been with Goodrich since 1931 and is a graduate of Williams College and the Harvard School of Business Administration.

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Face and Product Studies
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Private records covering 40 years of professional activity in coal fields of United States and Canada.

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Consulting Engineer
MINE MECHANIZATION
MINE MANAGEMENT
Oliver Building—Pittsburgh, Pa.

Trade Literature

AIR CIRCUIT BREAKERS—I.T-E Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa. Catalog 1002 includes sections covering selection and construction of this company's low-voltage air circuit breakers. The selection section contains rules for approximating necessary interrupting capacity of circuit breakers on both a.c. and d.c. systems. One table in this section gives allowable carrying capacities of wire and cable, both in free air and in raceways; a second table lists approximate full-load currents drawn by d.c. and a.c. motors from $\frac{1}{2}$ to 1,000 hp.

BULLDOZERS—Baker Mfg. Co., Springfield, Ill. Catalog 839 gives in brief form the facts about Baker bulldozers and graders. Whereas formerly both "straight-blade" and "curved-blade" type bulldozers were built, the new "400" series (Victory model) bulldozer has a moldboard that is said to combine the advantages and best features of both the older types.

MANGANESE STEEL—American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. Bulletin 1143CI tells what manganese steel is and describes its applications in construction machinery of many types.

BALL BEARINGS—New Departure Division, General Motors Corp., Bristol, Conn. Booklet R, the 1944 edition of "Interchangeable Ball Bearings for Replacement," contains numerically arranged lists of ten competitive makes of ball bearings together with corresponding New Departure numbers. Sections include a table of New Departure dimensional tolerances according to various A.B.E.C. specifica-

More tons per Man!



PORTRABLE ELECTRIC CAP LAMP



WITH PORTABLE *Electric* CAP LAMPS

"POWERED BY GOULD GLASSKLAD KATHANODE"

Coal mines are fighting today—fighting for greater tonnage in spite of shortages of experienced manpower. This fight has been made easier with the aid of Portable Electric Cap Lamps.

The protection and efficiency of these cap lamps aids in giving each man more tons per shift. Better light means better work—better work means greater tonnage—and greater tonnage means increased production to hasten the Allied victory.



Portable LAMP & EQUIPMENT COMPANY
OFFICE AND WAREHOUSE - 72 FIRST AVE. • PITTSBURGH 22 PA. PHONE ATLANTIC 0515

Safety Caps and Hats • Electric Cap Lamps • Flame Safety Lamps • Trip Lamps • Permissible Flash Lights
Shot Firing Equipment • Safety Shoes • Gas Masks • Goggles and Respirators • Haulage Safety Equipment • First Aid Supplies

MOTT DIAMOND CORE DRILLING

CONTRACTORS



Mott Type "A" Oil
Hydraulic 1500 Ft. Cap.,
2 1/4" Diameter Core.

• Coal and all mineral properties tested—using our light gasoline drills. They save fuel and moving costs... guarantee satisfactory and proper cores.

Pre-pressure grouting for mine shafts... ground solidification for wet mine areas by our stop grout method. Water wells and discharge holes drilled and grouted... electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

tions; a section explaining the meaning of prefixes and suffixes used with each make of bearing; comparative bearing type and series numbering systems; interpretation of New Departure bearing numbers for applying numerical designations to various bearing characteristics. Booklet ND-A57, entitled "Service Procedure for Ball Bearings?" gives in simple terms all of the steps from dismounting, cleaning and judging condition to remounting.

METALLIZING—Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y. Catalog 42B describes Metco metallizing guns, wires, surface-preparing tools and other metallizing accessories in detail. In addition it tells how sprayed metal coatings are saving critical materials and manpower in the production and maintenance of war-needed parts and equipment. A limited number of copies of its 80-page metallizing handbook also is being offered to present and potential users of the metallizing process.

VACUUM FILTERS AND DRYERS—Eimco Corp., 634-666 South Forth West St., Salt Lake City, Utah. Bulletin F2002, covering complete line of continuous vacuum filters and dryers, holds interest for chemical and other process industries that have dewatering or filtering problems.

WIRE ROPE—Macwhyte Co., Kenosha, Wis., has issued a 160 page buyers' guide with a tabbed index, replacing all previous additions. It contains in addition hints on

conservation and care. Copies may be obtained by writing on company letterhead to Jessel S. Whyte, president, Macwhyte Co., Kenosha, Wis. Conservation bulletins are now available in pamphlet form.

WELD INSPECTION—Lincoln Electric Co., Cleveland, Ohio. New arc-welding inspection chart is designed so that operators and inspectors can tell at a glance whether welds are being properly made. It pictures actual specimens of results obtained in making fillet and butt welds and describes briefly the appearance and characteristics of proper and improper weld beads, with a brief description of the conditions under which each was made. A portion of the chart describes the "Fleet-Fillet" welding technique, telling of its advantages, where and how to use, and including a table on procedure for single-pass horizontal and positioned fillets with "Fleetweld 11".

BELT DRIVES—Chain Belt Co., 1600 West Bruce St., Milwaukee 4, Wis. Booklet entitled "Wartime Care of Chain Belt Drives" gives information on maintenance, lubrication and repair of chain-belt drives.

ELECTRONIC CONTROL—General Electric Co., Schenectady, N. Y. Bulletin GEA-4126 explains in clear, simple language the fundamental principles of electronic tubes and their operation, describes the construction of the thyratron tube and lists the functions of eight of the more widely used

industrial-type tubes. It also describes and illustrates many practical applications of electronic control, including rectification, resistance welding, timing and processing operations, as well as photoelectric installations involving counting, sorting, weighing, measuring, registering, illumination, and the control of cement-kiln temperatures.

JACKS—Duff-Norton Mfg. Co., Pittsburgh, Pa. Catalog 202 features the company's wide line of jacks for all jobs of lifting, lowering, pushing and pulling. It lists those units which are being manufactured under present war-time restrictions.

ARC WELDING—C. E. Phillips & Co., 2750 Poplar St., Detroit, Mich. Booklet entitled "4 Ways to Salvage, Reclaim and Conserve Iron Castings by Electric Arc Welding" dispels much of the confusion and controversy which have surrounded the subject of making repairs on large castings by electric arc welding.

VALVES—Jenkins Bros., Inc., 80 White St., New York 13, N. Y. Bulletin Form 192 describes new line of air furnace malleable-iron gate, globe, angle and check valves.

LOCOMOTIVES—"Porter Steam Locomotives," a 68-page catalog issued by H. K. Porter Co., Inc., Pittsburgh, gives data on a complete line of industrial locomotives and railroad switching locomotives. More than 50 types are illustrated, with specifications and performance data given in most cases.

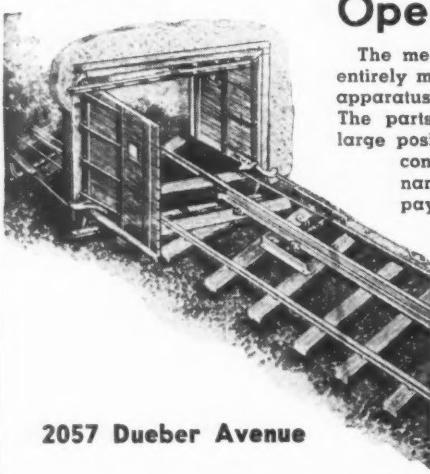
American Mine Doors ...Pay for Themselves



Miners marvel at the smooth, positive action of these automatically opening and closing mine doors. By opening quickly they speed up trips and eliminate trapper-boys. Faster moving trips mean greater mine profits, automatic action makes for real safety.

Operate Mechanically

The mechanism of the American Mine Door is entirely mechanical in its operation, no electrical apparatus to get out of kilter or create sparks. The parts are made from finest steel with a large positive margin in size to assure long life, continued operation and minimum maintenance. We repeat—American Mine Doors pay for themselves!



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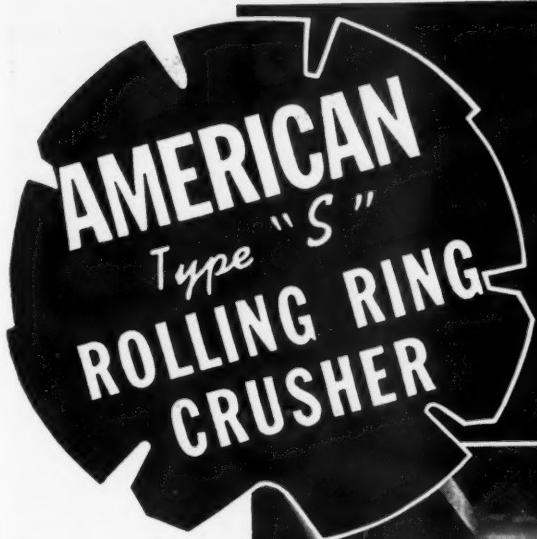
**AMERICAN
MINE DOOR CO.**

CANTON 6, OHIO

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O



THE POSITIVE ASSURANCE OF UNIFORM SIZES . . .

for either stoker or pulverized coal
even as you crush large tonnages

COMPACT

Easily Accessible

Externally
Adjusted



The splitting action of the SHREDDER RINGS shatters and distributes the coal before it reaches the Breaker and Grinding Plates.

These patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher. They have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at the specified speeds. In contact with solid metal, the rings are momentarily deflected from their usual course because they are free to swing back out of position. There are no shear pins or other safety devices that require attention.



★ The American Rolling Ring Crusher has the ability to crush coal at a total of less than one cent per ton, including power, labor, maintenance, and interest on investment. This point is being demonstrated wherever this unit is installed. The splitting action of our patented manganese steel shredder rings reduces fines to a minimum—the coal is split instead of being crushed.

You can get a type of unit exactly applicable to your requirements. Let us make recommendations based on our long and wide experience. Each crusher is guaranteed for the job. You get greater range of reduction—ease of operation, very low maintenance requirements, and exceptionally speedy crushing.

AMERICAN PULVERIZER COMPANY
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

1119 MACKLIND AVENUE
ST. LOUIS, MISSOURI



Just what ARE the
advantages of having
substation circuit breakers
made by I-T-E?

I-T-E substation circuit breakers are built specifically for mining service—and there is one direct advantage in that fact. Many times in mining practice it is not possible to live up to ideal schedules for inspection and adjustment of electrical equipment. I-T-E substation circuit breakers, for this reason, are so designed that they do the protective job they are bought for even though periodic inspection has been slighted and, as a consequence, control relays are not in perfect adjustment. Contacts do not freeze, and really serious trouble is rarely experienced.

The Type KSA circuit breaker illustrated, is for mining substation use. It protects semi-automatic or full-automatic motor generator sets, rotary converters or mercury-arc rectifiers. Its principal job is to reduce time losses resulting from disturbances on feeder circuits—and to remain in working condition so that it can perform whenever needed.

In its work, Type KSA is a veteran. In producing and applying it, I-T-E has developed more experience with the protection of d-c circuits in mines than any other group. From the standpoint of mine operators, the Type KSA is an established device, well understood and readily accepted.

Let I-T-E engineers give you the details of the Type KSA, outlining its advantages against years of dependable diversified service.

Representatives in Principal Mining Areas

AIR SWITCHGEAR

IMMersed IN AIR

ENCASED IN STEEL

The Army-Navy "E" for

Production Excellence

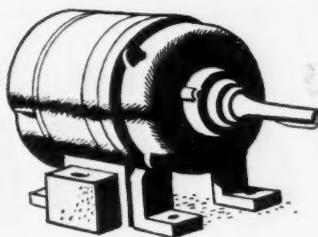


CIRCUIT BREAKER CO., PHILADELPHIA 30, PA.



1

■ Moisture can play hob around electrical equipment.



2

■ It can be absorbed into the insulation and lower its dielectric strength.

DIELECTRIC STRENGTH



3.

■ It can eventually result in all sorts of maintenance misery, as every engineer too well knows.



4.

BUT THERE'S A PRACTICAL SOLUTION TO THE MOISTURE PROBLEM!



It's an insulation of glass... plus varnish

The *fibers* in all Fiberglas* Electrical Insulations are glass.

That's why they do not absorb moisture and thus they provide a better base for impregnation. As a result, the impregnated Fiberglas provides high resistance to destructive effects of moisture.

Similarly, most corrosive vapors do not attack this durable insulation, for the simple reason that glass fibers are unaffected by oils and acids (except hydrofluoric).

Before the war, alert engineers were skillfully adapting Fiberglas to many kinds of equipment working under tough conditions. Fiberglas gained wide acceptance as a superior electrical insulation.

For the same reasons, it has gained

wide acceptance in the Army, Navy, and war industries for many types of motors, generators, and transformers—for wire and cable in planes, tanks, and ships.

As the production of Fiberglas Electrical Insulation is being constantly increased, more and more of this material is becoming available for more applications.

Many design engineers, now working with Fiberglas, are also looking ahead. They see how they will get outstanding performance with this glass material in all kinds of electrical equipment for post-war markets. They also know that Fiberglas gives them all the standard forms of electrical insulation to work with.

Those who have repair or rewind problems will also find it helpful to consult

their electrical distributor regarding the possibility of using Fiberglas.

Owens-Corning Fiberglas Corporation,
Toledo 1, Ohio. In Canada, Fiberglas
Canada, Ltd., Oshawa, Ontario.

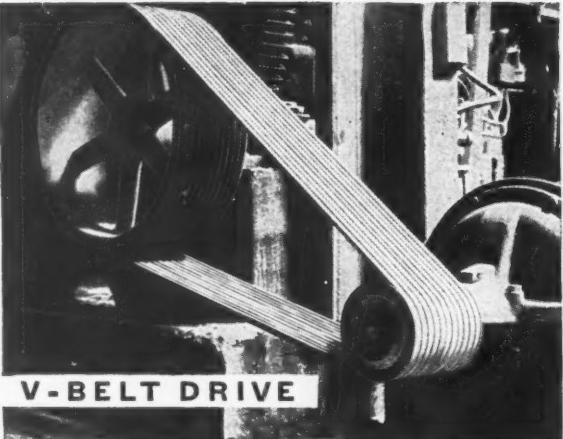


FIBERGLAS*

*T. M. Reg. U.S. Pat. Off.

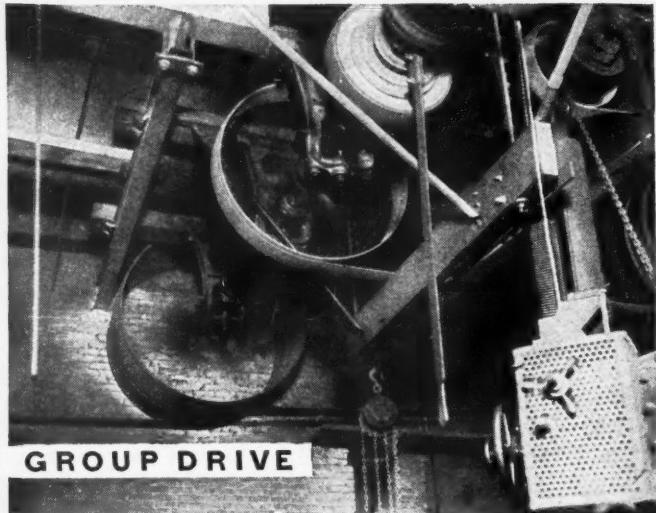
ELECTRICAL INSULATION

Wood's CAN SUPPLY YOU WITH QUALITY TRANSMISSION EQUIPMENT

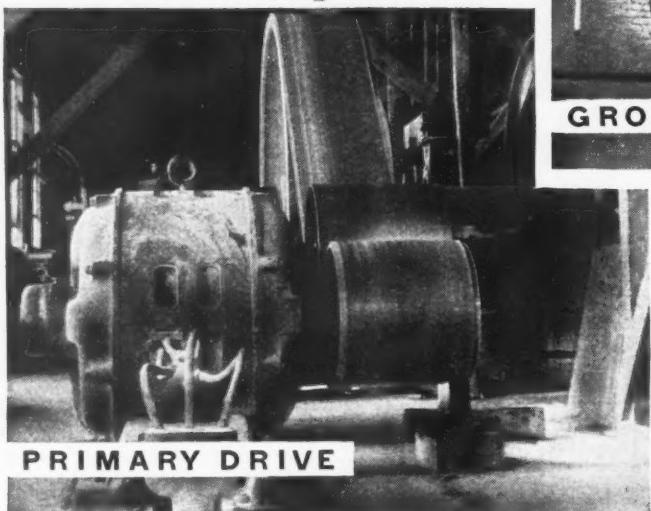


V-BELT DRIVE

FOR ANY TYPE OF



GROUP DRIVE



PRIMARY DRIVE

EVERYTHING IN TRANSMISSION

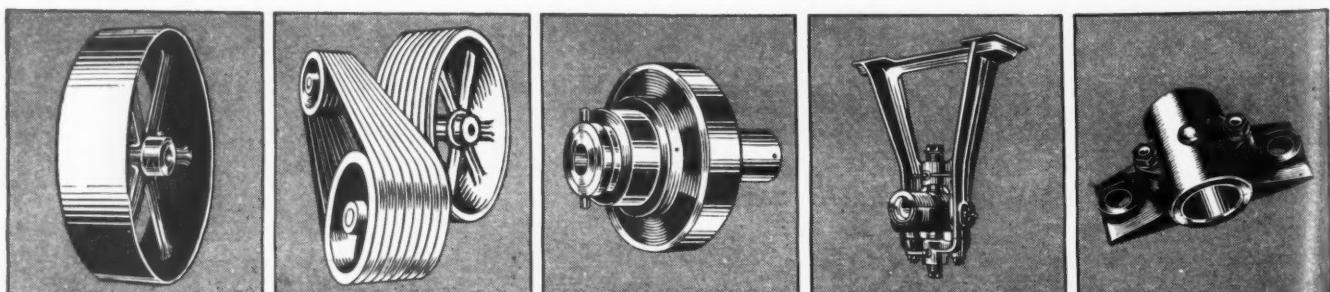
Bearings — Collars — Clutches — Couplings — Contactors — Hangers
Pillow Blocks — Pulleys — V-Belt Sheaves and Complete Drives

Wood's have devoted 87 years to the development and manufacture of better power transmission equipment. Because of this long experience, Wood's is better able to serve the extraordinary demands of industry today as well as in normal times.

For the performance you want in transmission—economy, efficiency, long life—consult Wood's.

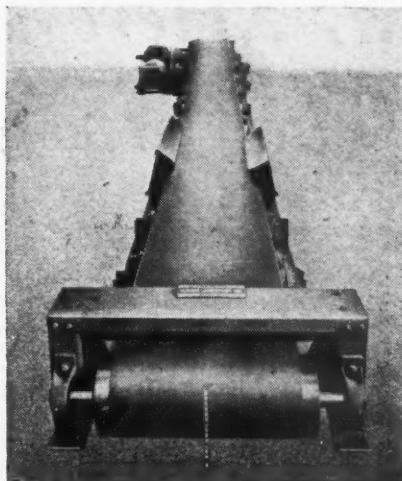
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BRANCHES—387-391 Atlantic Ave., Boston, Mass.
83 Plane St., Newark, N. J.—425 First Ave., Pittsburgh, Pa.



THIS NEW MINE CONVEYOR GETS OUT TONNAGE!

This Robins Mine Conveyor is strong, rugged, adaptable. It is built substantially to handle a high rated capacity . . . easily, smoothly, efficiently. It can be set up and dismantled quickly . . . without using tools. It gets out tonnage!

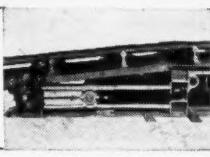


1 With a belt line only 15" above the floor and belt widths of 24", 26" or 30", the Robins Mine Conveyor handles up to 300 TPH over lengths as great as 3000 ft.

2 The Takeup is in the Head Section—belt-tension can be adjusted without walking the full length of the Conveyor. The Takeup can be operated from either side.



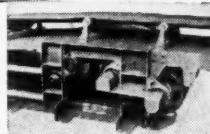
3 Ten feet of belt-slab are handled by this Takeup. A special 4' section dropped into the Conveyor handles 8 ft. more—a total of 18 ft. without cutting the Belt.



4 The Drive unit can be mounted on either side of the Head Section. It can be operated in reverse direction for bringing men and materials into the mine.

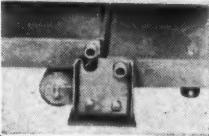


5 Although the Robins Mine Conveyor operates normally with single pulley drive, Pulley Outfits are built into the Head Section for tandem pulley drive.



The Robins Mine Conveyor can be fed from the Tail end or from either side anywhere along the entire length of Intermediate Sections. Both Head and Tail Sections are on skids for smooth sliding over rough surfaces. There is no steel work under the projecting

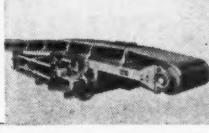
6 It is easy to extend the length of this Mine Conveyor. Just drop in new Intermediate Sections as you need them. No tools are necessary. Not a single bolt to bother with.



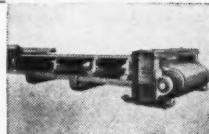
7 Loading Plates are standard equipment. They can be put anywhere along the Conveyor—on either side. And they are attached quickly—held in place by hook bolts.



8 Idlers are genuine Robins make, ball-bearing type, easily lubricated from either side. And they are 4 inches in diameter! No wonder this Conveyor gets out tonnage!



9 The Return Idlers clear not only the floor but the average amount of floor-accumulation as well. They are properly spaced for the size of coal handled.



Head Section or under the Tail Section—both ends are easy to clean out. If you are interested in getting out tonnage, get the facts about this Robins Mine Conveyor. Write Dept. CA-2 for details today.

ROBINS makes: BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

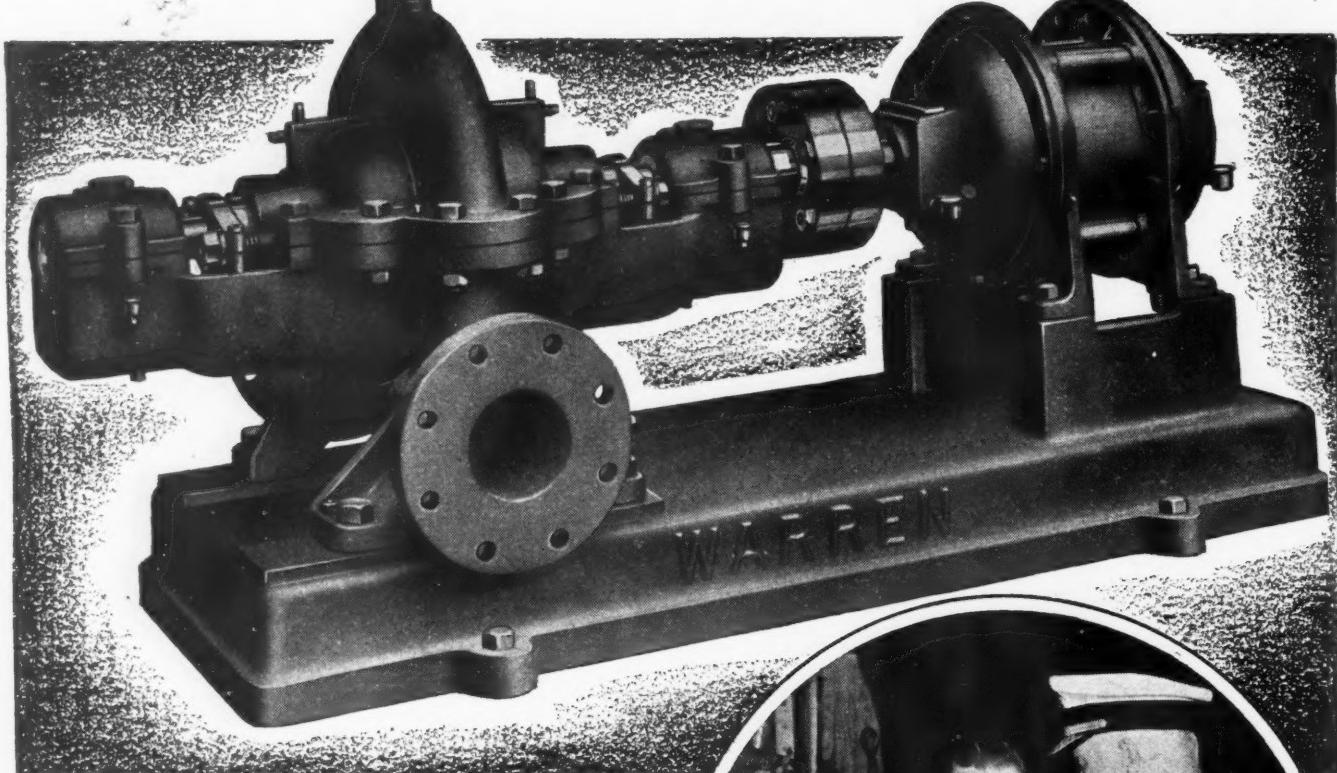
FOR MATERIAL AID IN MATERIALS HANDLING It's ROBINS

ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS
CONVEYORS
INCORPORATED
Founded in 1896 as Robins Conveying Belt Co.
PASSEIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

POST-WAR PLANNERS— ... Here Are Other Warren Pumps That are Headed For The Top



WARREN SINGLE STAGE • DOUBLE SUCTION CENTRIFUGAL PUMPS TYPES DB AND DS

As an initial insight into the character of these Centrifugal Pumps, here are a few of their specifications:

Casing: — Close-grained, high test cast iron of the double suction, volute type divided on the horizontal center-line.

Impeller: — Gun bronze composition and of the double suction, enclosed type, accurately machined and balanced to insure freedom from vibration.

Shaft: — Ample diameter to safely transmit required power without undue bending and twisting.

Shaft sleeves, case rings, bearings, stuffing boxes, packing glands and all other features of design and construction are all completely in line with Warren's policy of "No Compromise on Quality". Write for further information or bulletins regarding these Warren Centrifugal Pumps.

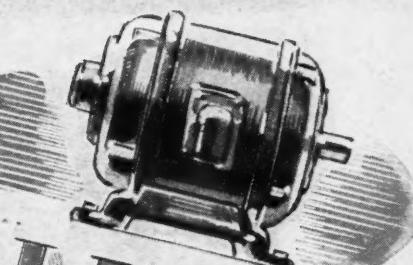


A Warren employee talks with an admiral about the Warren "E" Award. All Warren employees take great pride in the Warren Tradition for reliable, economical performance in peace times . . . and Warren's "service to the end" Tradition in war times.



WARREN STEAM PUMP CO., INC.
WARREN, MASSACHUSETTS

DO YOUR MOTORS CARRY . . .



The life of a motor is no longer than the life of its bearings. Bearing failure means motor failure and shutdowns. And the bearings may fail for any or all of the following reasons:—(a) poor design and construction; (b) neglected lubrication; (c) use of lubricant of poor quality; (d) dust and dirt in the bearings.

MOTOR MANUFACTURERS WHO HAVE ADOPTED NORMA-HOFFMANN "CARTRIDGE" BALL BEARINGS ARE PROVIDING THEIR CUSTOMERS IN-BUILT MOTOR LIFE INSURANCE--IN EFFECT, A GUARANTEE OF LONGER, MORE TROUBLE-FREE, LOWER-COST MOTOR PERFORMANCE—because:

A. The "CARTRIDGE" BEARING is a NORMA-HOFFMANN PRECISION product, designed EXPRESSLY to meet electric motor requirements.

B. With its double-row width, the "CARTRIDGE" BEARING provides WITHIN ITSELF a supply of lubricant at least twice that of any other single-row ball bearing.

C. The "CARTRIDGE" BALL BEARING is loaded at the factory with NORMA "STABILITY-TESTED" GREASE—a high-duty lubricant which has exceptional life and a wide temperature range, and moreover is chemically stable and water-repellent.

D. The highly efficient, wearless metal seals of the "CARTRIDGE" BEARING, so effective in KEEPING LUBRICANT IN the bearing, are equally effective in KEEPING DUST AND DIRT OUT. And they are removable and replaceable, making bearing inspection easy.

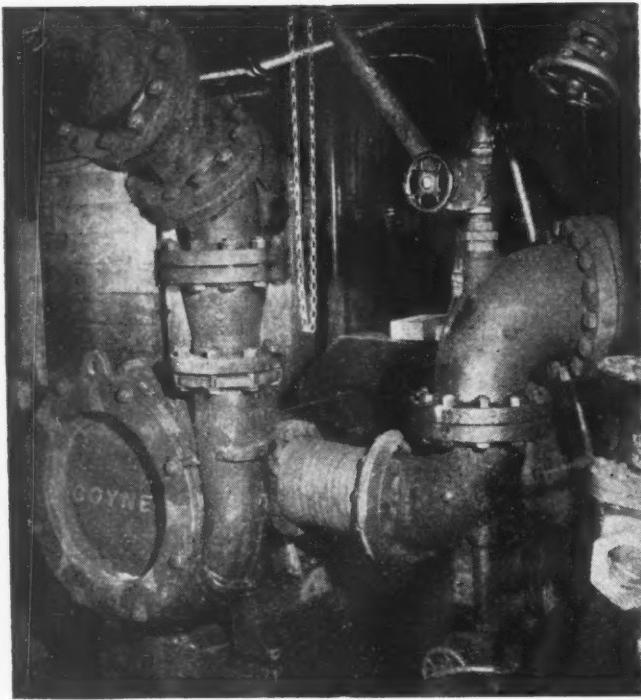
These, and other, distinctive features explain why so many motor manufacturers, seeking to assure their customers MAXIMUM MOTOR LIFE, have adopted NORMA-HOFFMANN "CARTRIDGE" BALL BEARINGS for their latest and most efficient motor models.

Ask for motors carrying the "life insurance" that NORMA-HOFFMANN "CARTRIDGE" BEARINGS provide. They will be a sound and lasting investment, returning good dividends in lower costs, longer life, and freedom from shutdowns.

NORMA-HOFFMANN BEARINGS CORP'N, STAMFORD, CONN. FOUNDED 1911

TO WIN THE WAR • WORK • FIGHT • BUY WAR BONDS

GOYNE PROCESS PUMPS



A Sand Pump is only a link in a chain in a coal washing plant, but it can be a strong link if it embodies the following features as does the Goyne:

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing only the rear head of the pump. No suction or discharge piping is disturbed.
2. The one packing box of the pump is subjected only to suction pressure and is readily kept clean by a low pressure clear water line. Long packing and shaft sleeve life is assured.
3. Impeller clearance is adjusted *while the pump is running*, insuring constant pump capacity so essential for uniform washing.
4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.
5. We carry the spare parts stock. Order your replacements when needed. Reduce your inventory by using Goyne Process Pumps.

*All inquiries receive prompt
and careful attention.*

**THE GOYNE STEAM PUMP CO.
ASHLAND, PA.**



The Hanovia Lighthouse Ultra-violet Lamp is an efficient time-saving, effective ultra-violet generator for group irradiation.

* Tests have proven ultra-violet one of the best and most dependable mediums for reducing absenteeism resultant from common ailments.

This Lighthouse has been created for the Ultra-violet irradiation of groups of persons. It has been designed to stand upon the floor in the center of an area about twelve feet in diameter where employees can walk or stand about the lamp at an average distance of five feet. Fifteen persons can be accommodated at one time at five feet distance—the ultra-violet application involving only a few minutes.

THE LIGHTHOUSE IS STURDILY BUILT, EASY AND ECONOMICAL TO INSTALL, MAINTAIN & OPERATE.

*Results of these tests available upon written request.

SEND FOR FREE BOOKLET,
"FITNESS IN INDUSTRY"
Address—Industrial Solarium Dept. C. A.

HANOVIA
CHEMICAL & MFG. CO.

NEWARK, N. J.

World's largest manufacturers of Ultra-violet Equipment
for the Medical Profession and Industry.

• Built by
Byron-Jackson
Co.



Big Coal Job Ahead!

Every machine that works in a coal mine in 1944 will have a responsible job . . . the task of moving more coal out of the earth and into furnaces for heat and power. Such a machine is this Mine Station Pump that faces long tedious hours of hard work in removing water from a shaft. But its bearings won't let it down. They're SKF's . . . the bearings with deep uninterrupted raceways permitting radial and thrust loads in any combination in either direction . . . that stick to the job the clock around, the year around . . . that have plenty of other advantages that make them first in the minds of men who know bearings.

\$466

SKF INDUSTRIES, INC., PHILADELPHIA 34, PA.



SUTTON SAND DRYING STOVES

Can Be Operated By Unskilled Labor

Today, when there's manpower shortage, it's important that your equipment is easy to operate—by anybody. That's an important feature of Sutton Sand Drying Stoves. Any worker about the plant can operate it to full capacity.



SUTTON FEATURES

- Made in four sizes to meet all conditions.
- Low original cost
- Economical upkeep
- Distributed by jobbers in all principal cities.

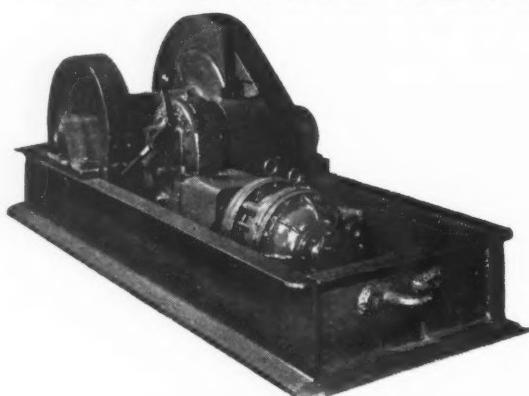
Satisfaction Guaranteed

Catalog and Prices sent upon request

INDIANA FOUNDRY COMPANY

950 Oak St., Indiana, Pa.

NEW! "FLOOD CITY" CAR SPOTTING HOIST

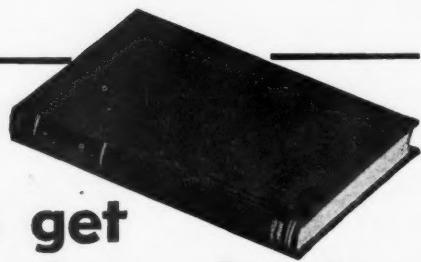


It will pay you to investigate the 6 new features incorporated in the "Flood City" Car Spotting Hoist . . . an entirely new design in which a 30 to 1 worm gear reducer replaces old style cumbersome reduction.

These are the new features: (1) Special Emergency Brake. (2) Any Standard 5 H.P. Motor. (3) Rope pull 6,000 lbs. at 35 ft. per minute. (4) Special Ahlberg Ball Bearings. (5) Sealed-in-oil Reduction Gear Unit. (6) Heavy Channel Iron Frame with turned up ends to facilitate moving.

WRITE TODAY FOR OUR CATALOG

FLOOD CITY BRASS & ELECTRIC CO.
JOHNSTOWN, PA.



How to get peak coal production

from your mechanical-loading equipment

Here are the most efficient methods of using various types of loading machines, conveyors, scrapers, and certain special equipment, in the loading and handling of coal underground, now presented in a readable, thorough, and practical treatment.

Just Published

Mechanical Loading of Coal Underground

By IVAN A. GIVEN

EDITOR-IN-CHARGE, *Coal Age*

397 pages, 6 x 9, 222 illustrations, \$4.00

THIS practical manual thoroughly discusses the various types of equipment used in slope-sinking, entry-driving and development work, and in production of coal from the usual or regular working sections—details the methods suited to or used with the various types of equipment and under various seam thicknesses and natural conditions—tells how machines are best installed, where they can fill in for other types of equipment, what to do to get biggest production from equipment.

Included in this sound book are over 200 necessary maps, plans, and sketches, showing how methods described in the text are practically applied to actual working conditions. A liberal number of mining plans tested in given mines throughout the country are here, as well as the latest thoughts on face preparation, power supply, and maintenance.

Tells you:

- every possible way in which equipment can be used
- how to keep equipment in first-class running order
- what factors to consider in purchasing mechanical-loading equipment
- when a small investment in simple attachments saves the purchase of an entire new machine
- installation considerations for all equipment
- methods for increasing mining extraction etc., etc.

CONTENTS

1. Mechanical-Coal-loading Principles
2. Mechanical-Coal-loading Essentials
3. Types of Mechanical-loading Units. Characteristics, Crews, Unit production—Hand-loaded Equipment
4. Types of Mechanical-loading Units. Characteristics, Crews, Unit Production—Self-loading Equipment
5. Slope-sinking and Development with Mechanical-loading Equipment
6. Conveyor-mining Plans
7. Scraper-mining Plans
8. Mobile-loader Mining Plans
9. Face Preparation
10. Power for Mechanical Loading
11. Maintenance in Mechanical Loading

ASK TO SEE IT—10 DAYS FREE

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Send me Given—Mechanical Loading of Coal Underground for 10 days' examination on approval. In 10 days I will send \$4.00, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

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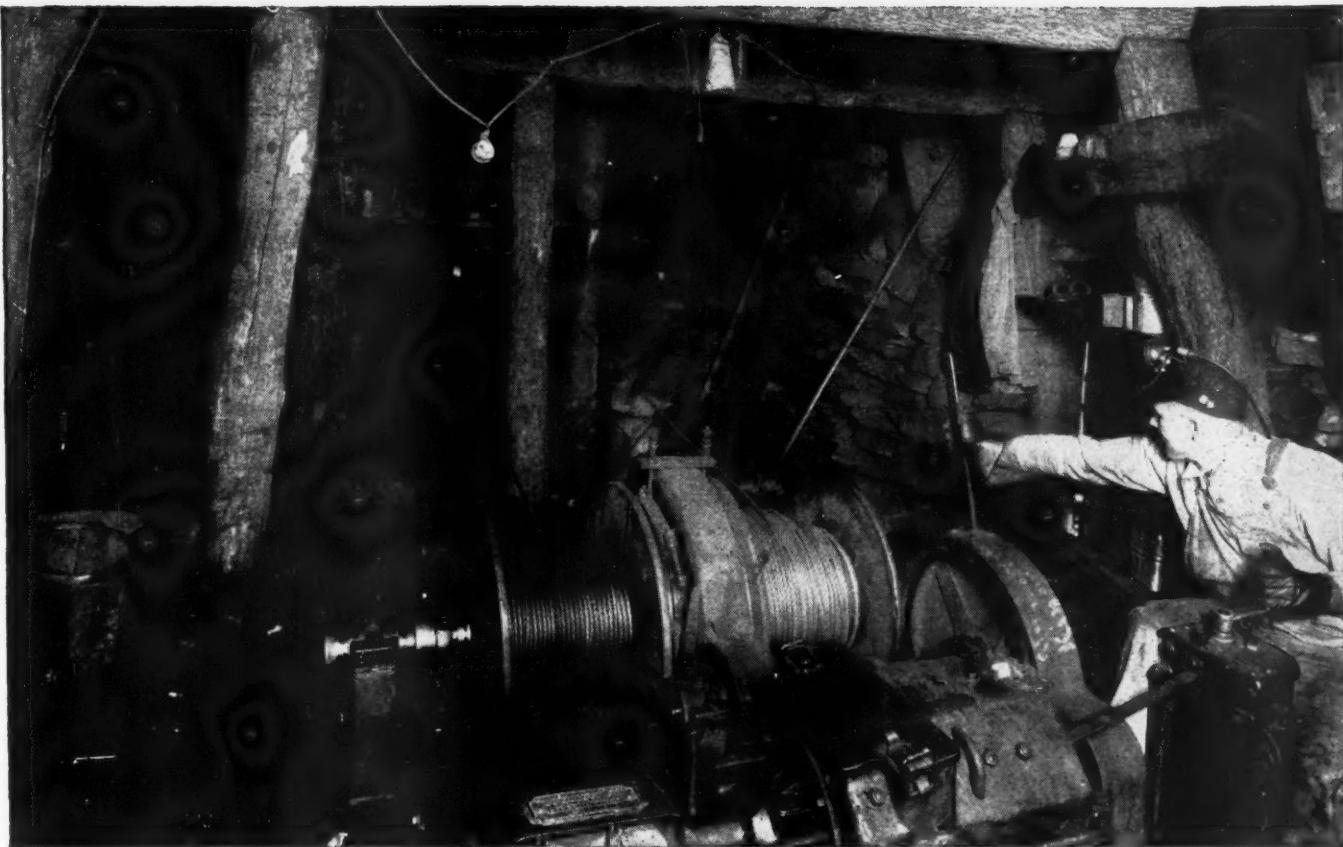
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City and State

Position

Company





A WAR MESSAGE... To The Man Behind The Throttle

Wartime calls for extra deftness in your throttle hand. Not only is it vital to the war effort to get more work out of your machine but at the same time do it with the least wear and tear.

Wire Rope especially must be given every possible care in order to last just as long as it possibly will. The chance of replacing wire rope is apt to continue limited. Great quantities of it still must be produced for our armed forces. As our offensive power gains momentum and invasions increase in number and scope, the greater becomes the tonnage of war materiel which must be hoisted, handled, loaded and unloaded all around the globe.

In the white heat of battle when lives depend upon it, wire rope must take abuse necessitating replacement long before its time. So it is that the important matter of conserving wire rope falls heavily on the throttle hand of users on the home front. To help you save wear and tear on your wire rope and keep it working, Union Wire Rope engineers have prepared and offer five different booklets entitled: *1. Correct Handling of Wire Rope.* *2. Lubrication of Wire Rope.* *3. Splicing Wire Rope.* *4. Socketing Wire Rope.* These give you specialized

information. *5. Rope Dope* amplifies on abuses of wire rope and the remedies. All are written in non-technical terms. Put into practice, the information contained in these booklets will help you contribute to the war effort now by conserving wire rope and it should stand you in good stead in safer and more satisfactory wire rope operation post-war. All are FREE for the asking. A penny post card request will bring any or all of the booklets.



• FREE

CORRECT
HANDLING OF
WIRE ROPE

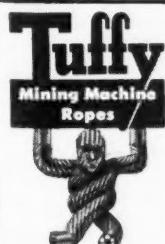
SOCKETING
WIRE
ROPE

SPLICING
WIRE
ROPE

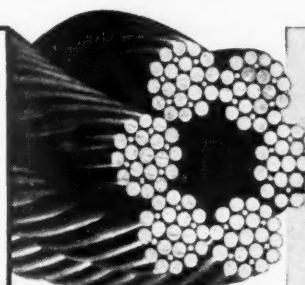
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ROPE
DOPE

For Two Years of
Team-work with
Our Armed Forces

UNION WIRE ROPE CORPORATION, 2130 Manchester Ave., KANSAS CITY 3, MO.
Tulsa Houston Chicago Salt Lake City New Orleans Monahans, Texas
Portland, Ore. Ashland, Ky. Atlanta MA-44

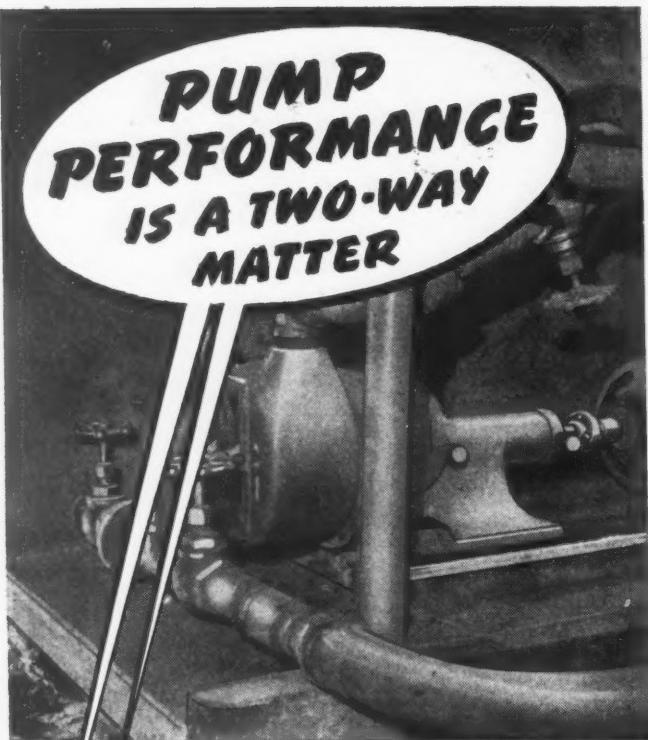


union-formed
and
union-clipped
for greater
safety and
longer service



union
WireRope

"THE ULTIMATE IN LOW COST WIRE ROPE"



1. Right Selection 2. Right Protection

Every Deming Mine Pump is capable of dependable performance under the conditions for which it was designed.

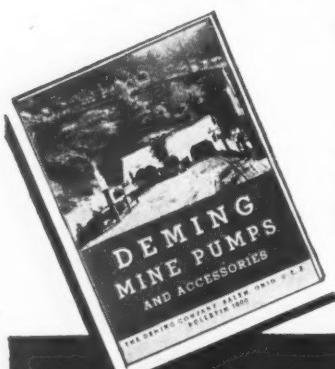
Maximum performance (meaning sustained efficiency at low operating and maintenance costs) is obtainable . . .

1. When the customer selects (or accepts the recommendation) of the pump best suited to the conditions, and . . .
2. Makes certain that whoever is responsible for protecting the pump against needless abuse fulfills that responsibility.

Deming Mine Pumps are like good automobiles . . . the better the care—the longer the wear.

**THE DEMING CO.
SALEM, OHIO**

Send for special Bulletin 1000 which contains important data on the complete line of Deming Mine Pumps and Accessories.



**DEMING
Mine Pumps**

The greatest help a coal mining man can have—

IF YOU want to make sure of getting your certificate of competency—sure of winning a bigger job with bigger pay, get Beard's great books today and put them to work for you.

In these three books you have a practical, always-on-the-job guide that will help you solve the problems you face every day, show you what to do, tell you why it should be done.

Beard's Mine Examination Questions and Answers!

3 volumes — \$7.50, payable in four monthly payments

THESE books explain what a man must know in order to become a mine inspector, a mine foreman, assistant foreman, fireboss, hoisting engineer, safety engineer, shot-firer, etc.

They give you complete and authoritative information about air and gases, explosives, safety requirements and methods, mechanics, engines, hoisting, drainage, pumping, ventilation, timbering, instruments, and every other detail that the practical mining man must know.

Can you answer these questions—

What is meant by splitting the air current and what are the advantages derived from such methods?

Can a miner live in air in which the oxygen content is reduced to 17 per cent?

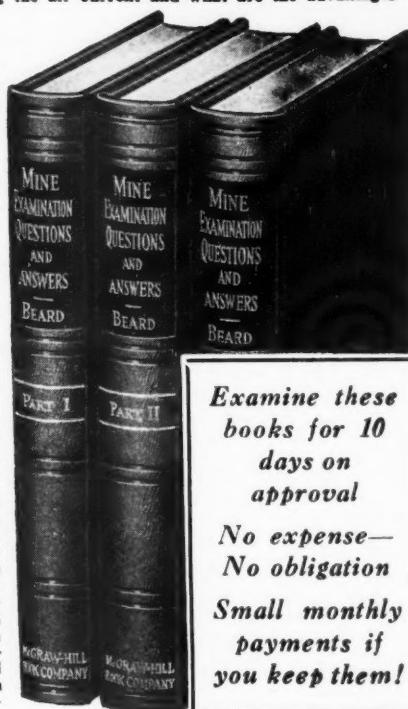
Name five duties imposed on mine foremen by law?

In what time can an engine of 40 effective hp. pump 4,000 cu. ft. of water from a shaft 360 feet deep?

What are the advantages and disadvantages of a gasoline pump, an air pump and an electrical pump?

What is the estimated tonnage per acre, per foot of thickness, for bituminous coal?

These are but a few of the more than 2000 questions given in Beard's books together with full correct answers. Hundreds of men have used this method to prepare for higher, better jobs. You can too, if you have the Beard books and plan to use them systematically. They are the best investment that a mining man can make—not only as an aid for passing examinations but as practical reference volumes on everyday mining operation problems.



Examine these books for 10 days on approval

No expense—No obligation

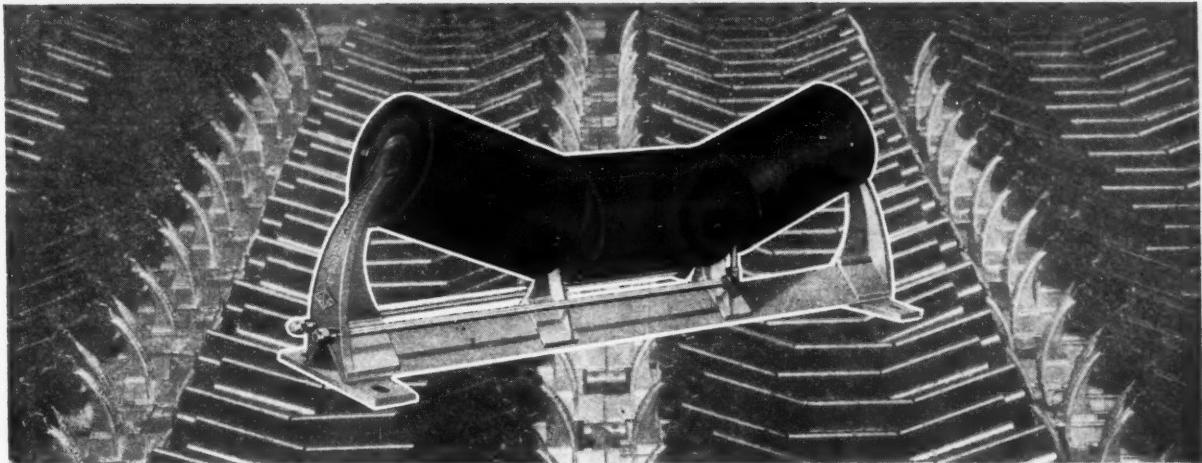
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McGraw-Hill Book Co., Inc., 330 W. 42 St., New York 18, N. Y. Send me, charges prepaid, Beard's Mine Examination Questions and Answers, 3 volumes, for 10 days' examination. If satisfactory I will pay \$7.50 at the rate of \$1.50 in ten days and \$2.00 per month. If not wanted I will return the three volumes postpaid.

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Belt Conveyors by *Continental*



Continental Idlers incorporate many entirely new features. SKF or Timken equipped, available in a complete range of sizes for every type of service. Write for Engineering Data Book ID-105.

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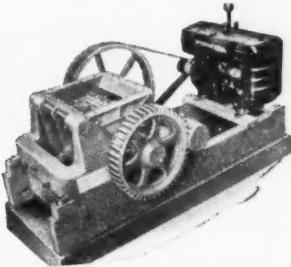
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MCLANAHAN BUILDS A TYPE AND SIZE FOR EVERY COAL CRUSHING REQUIREMENT! WRITE FOR DATA.

MCLANAHAN AND STONE CORPORATION
ESTABLISHED 1835
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HENDRICK

Carbondale 1600

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PERFORATED PLATE

Round—Squares—Diagonal—Slot
Any perforation

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ONE-MAN COAL DRILL

... lowers drilling costs because it is designed and constructed to give more power "pound for pound" and more drilling efficiency "day after day." Used successfully in drilling both anthracite and bituminous coal. Easy to operate. Sold with money-back guarantee. Write today.

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Division of The R. K. LeBlond Machine Tool Co.
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DUAL PRIME CENTRIFUGAL

PUMPS

Faster, surer double priming Centrifugals from 1½" to 10". Compact, portable, rugged. Renewable trash-type impellers and wear plates assures longer life and extra service. Get new PUMP catalog.

**Construction
Machinery
Co.**
WATERLOO, IOWA

CMC Dual Prime 2" Model 7
M.E.H. in strip pit at Streamline mine. Driven by G.E. 5
H.P. 3500 R.P.M. motor



BELT LACING
and FASTENERS
for transmission
and
conveyor belts



"JUST A HAMMER TO APPLY IT!"

ALLIGATOR

Trade Mark Reg. U. S. Pat. Office

STEEL BELT LACING

World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in

steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

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BELT FASTENERS AND RIP PLATES

For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in

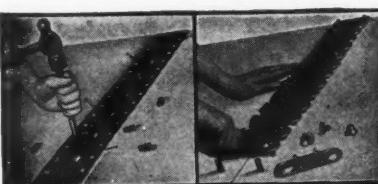
steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

Sold by supply houses
everywhere

FLEXIBLE STEEL LACING CO.

4638 Lexington St.
Chicago, Ill.



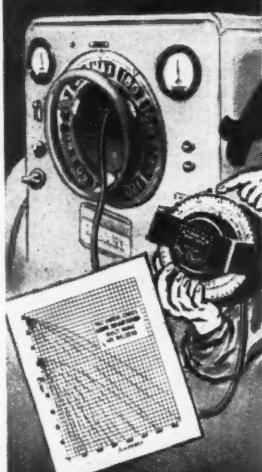
"CONVEYOR BELTS EASILY FASTENED"

PROMPT

DELIVERIES

can now be made on most models
of...

HOBART Simplified ARC WELDERS



Mail Your
Order with
**PRIORITY
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at Once!**

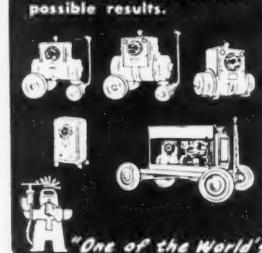
Right now is a good time to look to the future of your business and of your product. Every change you make today will have to be considered in the competitive field tomorrow. If you have enlisted the aid of Hobart welders to accomplish those changes and to stand behind them on the production line, you'll find your product in high standing. So turn to Hobart to keep your product up-to-date in design and performance, and production at the top of the ladder. Hobart Brothers Co., Box CA-124

TROY, OHIO, U.S.A.

PLAN NOW for Post War
with this new Service.

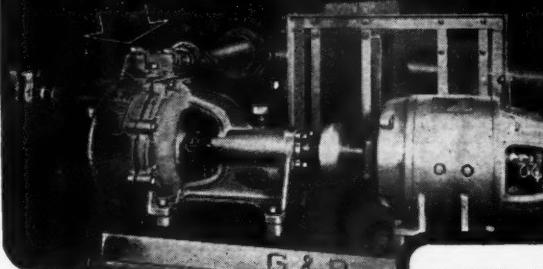
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for Arc Welding," a
remarkable service
that shows you
many ways in
which you can
use welding in
redesigning your
product.

Initial pages FREE!



"One of the World's Largest Builders of Arc Welders."

it PUMPS 24 hours a day with no "shut downs"



The keynote of the dependable G & R Mine Gathering Pumps is the word "simplicity". Because of greater simplicity (only one moving part—the impeller), these Self-Priming Centrifugals will pump more water, more continuous hours, per dollar invested than any other type. No valves to clog; no cylinder liners to be cut out; no gears, cams, levers, etc., to wear, break, or cause trouble. Pumps operate at motor speed. Capacities up to 220 GPM; heads up to 125 ft. Our engineering department will survey your requirements and make recommendations or write for Bulletin MP-2. It's free.

See our catalog data in Coal Mining Catalogs

**THE GORMAN-RUPP CO.
MANSFIELD, OHIO**

IN WEST VIRGINIA

the Koppers Company are replacing old pumps as they wear out with G & R self-priming centrifugal mine gathering pumps. At the Helen, Stanaford, Kimball, Stotesbury and Koppersown Mines 36 G & R Pumps of varying capacities are daily proving their simplicity and dependability.

Distributors in all principal Mining Areas.



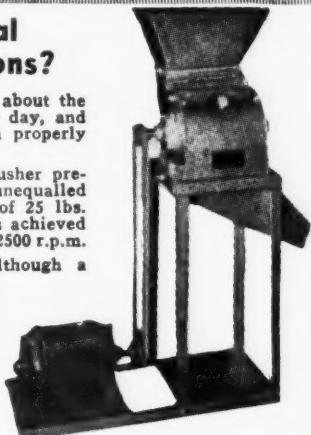
Does Your Coal Meet Specifications?

There's only one way to be sure about the quality of your product, day by day, and that is by constant testing in a properly equipped laboratory.

The WISE Laboratory Coal Crusher prepares coal for testing with unequalled speed and economy. Capacity of 25 lbs. per minute through $\frac{3}{4}$ " screen is achieved with $\frac{3}{4}$ hp. motor operating at 2500 r.p.m.

WISE Laboratory Crushers, although a comparatively new product, are already used and endorsed by some of the most prominent coal testing organizations in the United States. Write today for complete information.

O. B. WISE CO.
Knoxville, Tenn.

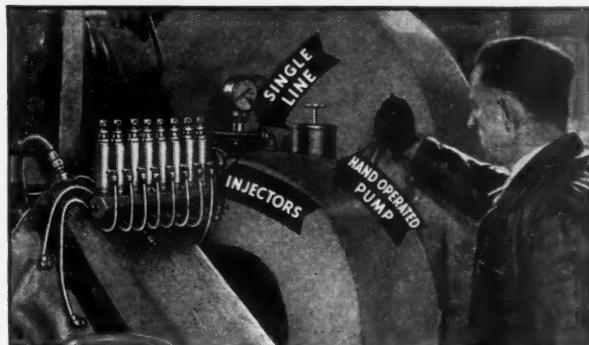


PERFORATED METAL COAL MINING SCREENS

Manufactured exactly to your specifications
Any size or style screen, in thickness of steel
wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.

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CHICAGO, ILLINOIS
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"EASY DOES IT"



LINCOLN CENTRO-MATIC LUBRICATING EQUIPMENT

**lubricates all bearings
from a single source**



EASILY INSTALLED on NEW or OLD MACHINES

Act now, and avoid bearing failures . . . Maintain production for Victory.

A Centro-Matic System consists of a number of Centro-Matic Injectors—one for each bearing—and a power operated or a hand operated Centro-Matic Lubricant Pump. A power operated system can be either time clock control or push button control . . . The injectors can be grouped in manifold or located separately at each bearing. In either arrangement only a single lubricant supply line is required.

Please write for Bulletin 671 and send us blueprints of the machines you plan to lubricate. Our engineers will gladly make recommendations.



THE ARMY-NAVY PRODUCTION AWARD
for high achievement in the production of war equipment, conferred upon the Lincoln Engineering Company has had two stars added. Each of these stars symbolizes 6 additional months of exacting service to our Armed Forces, delivering vital materials so necessary for ultimate Victory.

FOR VICTORY—BUY U. S. WAR BONDS and STAMPS 143-52

LINCOLN ENGINEERING COMPANY
PIONEER BUILDERS OF LUBRICATING EQUIPMENT
5701 NATURAL BRIDGE AVENUE, ST. LOUIS 20, MO., U. S. A.

SEARCHLIGHT SECTION

WANTED

ENGINEERS AND DESIGNERS

of heavy mining machinery for coal mine purposes.
Permanent men wanted who will stay with company in postwar period.
Located in small town within short distance to large cities.

P-248, Coal Age
330 West 42nd St., New York 18, N. Y.

POSITION VACANT

SALES ENGINEER with mining experience particularly in mining machines and loading machines. Well known grease manufacturer has sales territory for practical man around 40 years of age. Sales experience unnecessary as we are looking for an engineer first who will be able to successfully demonstrate our product. Good opportunity to develop larger earnings as your business grows. In writing give full details. P-249, Coal Age, 16 South Broad Street, Philadelphia 2, Penna.

POSITION WANTED

ANALYTICAL CHEMIST available now for permanent position. 7 years experience with coal, water, oil, gasoline. 3A-H. Free to travel. Wm. Thompson, Woodhull, Ill.

FOR SALE

FOR SALE: Two (2) Jeffrey 29-B-Arc Wall Cutting Machines—250 Volts—18 inch gauge—each with 8-inch gooseneck. Machines have just been taken out of service and are in good running order. FS-250, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

SCRIP ISSUING MACHINE made by National Cash Register Company. Prints coupon on bank check paper and eliminates use of tokens. Also prints journal record for posting. Prevents dishonesty. Time saver. Worker retains part of coupon for his record. Machine adds like cash register. Green River Mine, South Carrollton, Ky.

MOON STEAM TURBINE GENERATOR—110 V., 2160 RPM, Type 4A, Serial No. B12619A—\$125.00 Cochrane Water Heater and Purifier, suitable for 150 H.P. boiler—\$50.00. W. C. Hudson, Brilliant, Ohio.

FOR SALE: Sizeable boundary of coal land carrying two workable seams and located in the gigantic Tennessee Valley development area. One 48" seam of excellent steam coal. Mine now operating on this seam has 10,000 ton per month contract. This mine is included in deal. Other seam, 34" thick, makes good stoker coal as well as good steam coal. Conditions in this seam ideal for all-conveyor mine. Large tonnage of stoker coal can be delivered from mine by truck. Continuous post-war market assured. FS-251, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED

ANYTHING within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for LimeStone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.



FOR SALE

Rental Coal Business 95% cash—20,000 ton yearly in Large Central New Jersey City. Modern equipment: Silos, all-concrete yard, Godfrey conveyor. Large outdoor storage capacity. Capable of expansion.

BO-245, Coal Age
330 W. 42nd St., New York 18, N. Y.

SPOT CASH

For complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.



Frank J. Wolfe

FOR SALE

TIPPLE

1—Practically new 5-track Link-Belt Steel Tipple, Hydro Link-Belt Coal Washer and re-screening plant, complete with dustless oil treatment device, shaker and vibrating screens, (4) loading booms and picking tables. Last word in preparation equipment—Built new in 1939. Can now be seen operating. Capacity 600-ton per hour. Will load 50 different grades and sizes of coal.

LOCOMOTIVES

- 3—10-ton Goodman, type 34-B-O-4-C.
- 3—10-ton Westinghouse, type 907-C.
- 2—8-ton Goodman, type 132-A-O-4-C.
- 3—8-ton General Electric, type HM-819.
- 3—8-ton Jeffrey, type MH-100.
- 3—6-ton General Electric Gathering, HM-823.
- 3—6-ton Goodman Gathering, type 33-1-4-T-2.
- 5—6-ton General Electric Gathering, type HM-801.

LOADING MACHINES

- 20—5-BU Joy Loading Machines, 250 volt DC.

ELECTRIC HOISTS

- 1—800 H.P. Allis-Chalmers, single drum, Slope Hoist, 7000' of 1 1/4" rope, 3000# rope pull, rope speed 870 FPM, 2300 volt.
- 1—500 H.P. Double Drum, 1600' of 1 1/4" rope, 2300 volt, Ward-Leonard Control.
- 1—1300 H.P. Shaft Hoist with cylindro-conical drums, 1675' of 1 1/4" rope, 2300 volt.
- 1—1300 H.P. Double Drum, cylindro-conical drum, 900' of 1 1/4" rope, 2300 volt.

Mail Us Your Inquiries!

COAL MINE EQUIPMENT SALES COMPANY
306-7 BEASLEY BUILDING L.D. Phone-34 Terre Haute, Indiana

FOR SALE

2000 ACRES OF COAL

in Buchanan County, Virginia

Moisture	0.65%
Volatile Matter	29.99%
Fixed Carbon	66.59%
Ash	2.86%
Sulphur	0.64%
B.T.U. Det.	14,676

1200 acres in one boundary with two miles frontage on Norfolk and Western Railway. The remainder in small tracts, 50 acres and up. Price \$200.00 per acre. Oil, gas and all other minerals, also timber for mining purposes and some saw timber go in on the deal.

THE ELOMAR CO., Owners
Box 276, North Tazewell, Virginia

FOR SALE

Approximately 20,000 Tons of Culm 1/2 mile from Erie R.R. Siding and on a State Highway with the following analysis, also seven acres of land.

Moisture, %	6.1
Ash, dry basis %	11.3
Over 5/16" screen %	0.0
Thru 5/16" over 3/16" %	0.5
Thru 3/16" over 3/32" %	19.8
Thru 3/32" over 1/16" %	20.5
Thru 1/16" over 3/64" %	14.3
Thru 3/64" over 1/32" %	18.6
Thru 1/32" %	26.3

No Reasonable Offer Refused

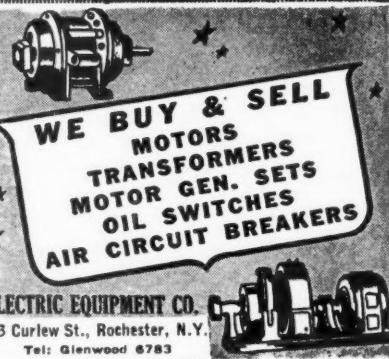
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Hawley, Pa.

DIAMOND CORE DRILLING, for any mineral. More than sixty gasoline, steam and electric drills, suitable for any job. OUR SPECIALTY—testing bituminous coal lands. Satisfactory cores guaranteed. Prices very reasonable.

HOFFMAN BROS. DRILLING CO.
PUNXSUTAWNEY, PA. Est. 1902 Tel. 382

We Sell, Buy, Repair & Calibrate
A.C. & D.C. Switchboard and Portable type
all types electric meters. Ship to us
any meters you have for repairs via
freight or express. We shall gladly submit
estimate.

Philadelphia Transformer Co.
2829 Cedar St. Phila., Penna.



WANTED

36" APRON FEEDER

Give dimensions, condition, make, and price.

R. E. TOMPKINS
Box 56, Brighton Station, Rochester, N. Y.

HOIST

1—Ottumwa double drum, single gear reduction Electric Shaft Hoist, complete, in first-class condition, with 60 horsepower, 600 revolution, 220 volt, 3 phase, 60 cycle, General Electric motor.

LESLIE E. BRYANT
Clarksville, Arkansas

200 Ton—Niles Wheel Press
30 x 30—D. R. Coal Crusher
150 KW—Belted D.C. Generator—250 V.
125 KW—M. G. Set
125 KW—Generator Engine Unit—250 V

ARTHUR S. PARTRIDGE
St. Louis, Mo. 415 Pine St.

New "SEARCHLIGHT" Advertisements
received by February 28th, will appear
in March issue, subject to space limita-
tions.

Departmental Staff
COAL AGE
330 West 42nd St., New York 18, N. Y.

SEARCHLIGHT SECTION

**FOR
IMMEDIATE
DELIVERY
OF
RUBBER PRODUCTS**

Conveyor Belting...Transmission
Belting...Elevator Belting...Fire,
Water, Air, Steam, Suction or
Welding Hose, etc.

CALL, WIRE or WRITE
CARLYLE
THE
RUBBER HEADQUARTERS

**CARLYLE RUBBER PRODUCTS ARE
NEW, GUARANTEED & LOW PRICED**

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	8	1/8"	— 1/16"	20"	5	1/8"	— 1/32"
42"	5	1/8"	— 1/16"	20"	4	1/8"	— 1/32"
36"	6	1/8"	— 1/16"	18"	4	1/8"	— 1/32"
30"	6	1/8"	— 1/16"	16"	4	1/8"	— 1/32"
30"	5	1/8"	— 1/16"	14"	4	1/16"	— 1/32"
24"	5	1/8"	— 1/32"	12"	4	1/16"	— 1/32"
24"	4	1/8"	— 1/32"				

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes "D" WIDTH All Sizes
"B" WIDTH All Sizes "E" WIDTH All Sizes
"C" WIDTH All Sizes Sold in Matched Sets
Inquire For Prices - Mention Size and Lengths

PROTECT THAT PLANT

FIRE HOSE

APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	\$28.00
—	25 "	16.00
2"	50 "	23.00
—	25 "	13.00
1½"	50 "	20.00
—	25 "	11.00

Specify Thread On Couplings

CARLYLE RUBBER CO., INC.

62-66 PARK PLACE

NEW YORK, N.Y.

FOR SALE

1 Used Goodman 260 track loading machine, 250 volts D.C., 42 inch track gauge. Government approved motor. Listed as serial #107. Purchased 1937.

FS-246, Coal Age
68 Post St., San Francisco 4, Calif.

MOTOR

Slip ring, 125 H.P., F.M., 3 Ph., 60 Cy., 440 V., B/B, 1750 RPM; with drum type controller and resistance. Very attractive price.

The Industrial Equipment Corp.
P. O. Box 1647 Pittsburgh 30, Pa.
Warehouse: Carnegie, Pa.

REBUILT—GUARANTEED

1-200 KW, 250 V. West. Converter
1-200 KW, G.E. Rotary Converter
3-55 KVA, G.E. Rotary Transformers
3-165 KVA, G.E. Rotary Transformers
A.C. & D.C. Rotary Control Panels
3-Oxide Film, G.E. Lightning Arrestors
Oil & Air Circuit Breakers
1-1 R Portable Air Compressor
Motors: A.C. and D.C.
6000 Amperes DB-257 Line Contactors
Power Distribution & Current Transformers
150-5 Amperes, 110 Volt, 2 Wire Meters
3-S & C Oil Filled Fuses with Supports
1-24 Circuit Control Breaker Panel

R. H. BENNEY EQUIPMENT COMPANY
NORWOOD (12), OHIO

6 YD. or 8 YD. STRIPPER SHOVEL

225 Bucyrus 80 ft. Boom, 54 ft. Dipper Stick, Steam Shovel.

2-4 Yds. SHOVELS

2 Marion Model, 125, Electric, 35' Boom.
25' Dipper Sticks
50,000 gal. Tank on 100' Tower.
1-52B 2½ Yd. Cap. 80 ft. Boom Diesel Caterpillar Dragline.
10-25 yd. Western Air Dump Cars.
3-50 Ton Heisler Geared Locomotives.
2-2½ Marion Electric Shovels.
75-1½ & 2 Yd. Dump Cars.

AIR COMPRESSORS:
(7) Steam 66 ft., 300 ft., 600, 1000 & 1940 ft.
(12) Belted, 360, 676, 870, 10000, 1300 ft.
(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2000, 5000 ft.
(14) Gasoline, 10, 160, 220, 310 & 370 ft.

COAL CRUSHERS:
Jeffrey Single Roll 18x18, 24x24 & 30x30
Link Belt 26x24 Double Roll Crusher

COAL CUTTERS:
Sullivan CRG Top Cutter with Government Approved D.C. Motors
6-Sullivan CR2 Short Wall Undercutter A.C. Motors
Goodman #212 Low Vein with A.C. Motor
3-Goodman 12E Short Wall with D.C. Motors

HYDRAULIC CARWHEEL PRESSES:
100 Ton, 150 Ton, 300 Ton, 300 & 400 Ton Caldwell - Niles - Wood - Watson Stilliman

RUBBER CONVEYOR BELTS:
100' 60", 600' 30", 300' 20", 1000' 42", 900' 48", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14".

TANKS:
12,000 and 15,000 gal. and 20,000 gal.

CONVEYOR PARTS:
Idlers, Heads & Tail Pulleys, Steel Frames, Tripers, etc., 14 In., 6 In. Large stock here.

SYNC. MOTOR GENERATORS & ROTARYRS:
100 KW Ridgway 1200 RPM 3/60/2300/250-275
150 KW G.E. 1200 RPM 3/60/2200-250-275
200 KW Ridgway 900 RPM 3/60/2200-250-275
3-100 KW G.E. 275 v. 1200 RPM Rotaryrs

STORAGE BATTERY LOCOMOTIVES:
2½ ton Witcomb 24 ga. New Batteries
2-4 ton G.E. 30 in. ga.
3-5 ton Mancha 30 in. ga.
4-5 ton G.E. 36 in. ga.
3-7 ton Goodman 36 ga. Battery & Trolley
8-10 ton Baldwin Westinghouse 42 ga. & 36 ga.

TRACK SCALE:
150 Ton Buffalo 56 ft. R.R. Track Scale

TROLLEY LOCOMOTIVES:
T-10 ton Westinghouse 24 ga.

4-6 ton & 3-5 ton Goodman 36 ga.
3-6 ton Goodman 30 ga.
4-6 ton Goodman 42 ga.
5-6 ton Westinghouse 42 ga.
2-8 ton Goodman 36 ga.
10 ton Goodman 42 ga. & 1-ton Jeffrey.

VIBRATING SCREENS:
9 Tyler Hummer 3x6, 4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex

CARS:
60-Western 16-20-30 yd. Side Dump

SHOVELS, CRANES & DRAGLINES:
3 W 90' Boom, 6 & 160' Boom, Model 6150, 175'
Boom, Diesel, Monighan Walkers
1 yd. K 30 Link Belt 50' Boom Crane
2yd. Page 70' Boom Diesel Dragline
1½ yd. Marion 450 Elec. Shovel
1½ yd. Lima Diesel Shovel & Dragline
2 yd. Link Belt Elec. Shovel & Dragline
25 ton Browning 50' Boom Crane

MINE LOADERS:

Junior Joy 36 ga. Low Pan
Conway 20 Mucker

3-5 BU & 7 BU & 12 BU 36 or 42 ga. Joy

9-Goodman 200 & Jeffrey 441

7 Conway 20A, 30A, 50A, 60 & 75 Muckers

MISCELLANEOUS:
15 Ton Plymouth 36 ga. Diesel Locomotive
5'x180' Traylor Rotary Dryer

6-Goodman 12CA & 12DA 6 ft. Cutters

9x8 Sullivan Mine Compressors
Clamshell Buckets ¾; 1, 1½ & 2 yd. Cap.
30 ton & 12 ton Vulcan St. Ga. Gas. Loco.

WANTED TO BUY:

Complete Mine-M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers & Rotary Converters. Also Rails, Screens, Pumps, Cars, Mine Loaders & Mining Machines.

R. C. STANHOPE, INC.

60 East 42nd St. New York, N.Y.

NEW and REBUILT STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Ton—18" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

SEARCHLIGHT SECTION

LOCOMOTIVES

Goodman: All 250 volts.
 1—10 ton, 31-1-4-T.
 1—6 ton, 30B, 48".
 1—5 ton, W-1-2, 36".
 1—5 ton, 10-30.
 2—4 ton, 2600 K.
 1—6 ton, 33-1-4-T.
 2—8 ton, 32-1-4-T.
Westinghouse: All 250 volt.
 1—4 ton, 902, 48".
 1—904 c. 44" 500 volt. Also 906 motors.
 1—10 ton, 915.
G.E.: All 250 volt.
 4 ton 1022, 44", as is
 6 ton 803, 44", as is
 6 ton 823, 44"
 6 ton 801
 8 ton 839
Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt
 1—Jeffrey MH 110 Locomotives
 1—Jeffrey MH 100.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS * FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll) 12"x16", single roll 24"x36", 36"x36" * CONVEYOR HOISTS, 24"x34", 18"x34", 12"x34", 10"x34", 8"x34", 6"x34", TURBO-GENERATOR 500 K.W., 275 volt DC * ROPE & BUTTON CONVEYOR 400' long LATHES, SHAPERS, SWITCHES * AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps * MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps * HOISTS, overhead, AC, 3-60-440, 1 ton and 2 ton * CAR RETARDERS, Fairmont 1 Clam shell bucket 1/4 cubic yard, 1—Figure 8 drum * MINE CARS 22" high, 44" gauge 2 SULLIVAN BIT SHARPENERS * R.R. SWITCHES 85# to 100# * HOISTS 5 HP AC and DC. GENERATORS DC 250-275 volt, 30 KW to 100 KW. Also 50 KW 125 volt direct connected to steam engine.

GUYAN MACHINERY COMPANY, Logan, W. Va.

ROTARY CONVERTERS

500 KW G.E. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
 500 KW AL-CH SYN. 275 V. 60 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
 500 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
 300 KW G.E. SYN. 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
 200 KW G.E. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.
 200 KW AL-CH SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
 150 KW G.E. SYN. 275 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.

MOTOR GENERATORS

300 KW RIDGEWAY SYN., 275 V., 440/2300/4000 V., 3 Ph., 60 Cy., 720 RPM, Manual Switchgear.
 200 KW G.E. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.
 200 KW G.E. IND., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.
 200 KW R.W. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, 80% P.F., Manual Switchgear.
 200 KW WEST. Syn., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, 80% P.F., Manual Switchgear.

LOCOMOTIVES

13-T WESTGHE, 250 V., 908-C Mts., 36"-36" Ga.
 18-T WESTGHE, 250 V., 907-C Mts., 36"-44" Ga.
 19-T WESTGHE, 800 V., 907-C Mts., 36"-44" Ga.
 8-T WESTGHE, 250 V., 906-C Mts., 36"-44" Ga.
 8-T WESTGHE, 800 V., 906-C Mts., 36"-44" Ga.
 8-T GOODMAN, 250 V., 132-A Mts., 36"-36" Ga.
 6-T WESTGHE, 250 V., 904-C Mts., 36"-44" Ga.
 4-T WESTGHE, 250 V., 902-C Mts., 36" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY
Incorporated

501 Grant Building Pittsburgh, Pa.

COMPRESSORS

300 CFM Chi. Pneu. with 75 H.P. motor
 826 CFM Ingersoll-Rand, Style "JC",
 889 CFM Ingersoll-Rand Type 10XB horiz. 2-st.,
 100x W. P., 150 H.P., 3/60/440 V motor and
 starter, etc.
 888 CFM Ingersoll-Rand Type 10XB horiz., 2-st.,
 100x W. P., 75 H.P., 3/60/440 V motor and
 starter, etc.
 940 CFM Ingersoll-Rand 10 horiz. 2-st. steam driven with receiver.

CRUSHERS

24" x 54" Superior Crushing Rolls
 #3 McCully Gyrotary
 #6 McCully Gyrotary

HOISTS

B-American Hoist & Derrick Co. double drum, motor driven with 40 H.P. A.C. motors

MOTORS

125 H.P. G. E. Type I-12-125A, 600 RPM, complete with controller, etc.
 150 H.P. Allis Chalmers, 695 RPM, complete with controller, etc.

IRON & STEEL PRODUCTS, INC.
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 "Anything containing IRON or STEEL"

MINING MACHINES

Jeffrey: 35B, 29B, and 4—28A, 250 V.
Goodman: 12A, 12AB, 12AA, 12GSA, 34B.
 1—12G3 250 volt and 2—112 DA, 500 volt.
 2—Permissible Type 12CA. 6—112AA.
 3—124AA.
Sullivan: CE7, CE9, CE10, CR10 Low Vein.
SUBSTATIONS—275 volts, D. C.
 2—200 KW G.E. Rotaries (600 volt)
 1—200 KW Ridgeway M.G. Set.
 1—200 KW G.E. Rotary Converter.
 1—200 KW West. Rotary.
 1—150 KW West. Rotary.
 1—200 KW 1—100 K Ridgeway M-G Sets.
 1—150 KW Ridgeway Rotary.
 1—150 KW West. Rotary-converter.
 1—100 KW West. M-G Sets.
 1—90 KW G.E. Rotary.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, MH 88, 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 12AB, 12AA 33-1-4-T, 31-1-4-T. **General Electric** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW Westinghouse Rotary Converter Armature, 250 V. Bracket Type, 150 KW G. E. HCC Bracket Type, and 150 KW G. E. TC Pedestal Type.

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IRON and STEEL PIPE New and Used

Large stocks, all sizes
 attractive prices

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REBUILT & GUARANTEED

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SHIPMENT

Jey 12-BU Loader, 220 V., 3 Ph., 60 Cy. Rebuilt

Equipment of all kinds

Buy, Sell or Exchange

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Warehouse: Carnegie, Pa.
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FOR SALE

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52-B 2 1/2 Yd. Bucyrus-Erie Electric Shovel
 K-48 Link-Belt Dragline-Heselmen Oil Engine, 2 yard bucket.

45-B Bucyrus-Erie Diesel Dragline, 65' boom.
 43-B Bucyrus-Erie 1 1/4 yd. Shovel. Gas Engine.

Model 6 Northwest Dragline-Crane. 60' boom.
 Osgood 1 1/2 yard Shovel. Buda Diesel Engine.

Model 1500 Speed-Crane Dragline-Crane. 60' Boom.

4—14 yard 10-W Wagons with Tournopull
 Model C Tractors with Cummins Diesel Engines.

2—Model 44 Loomis "Clipper" Full Crawler Well Drills.

ALL THESE MACHINES ARE
 IN VERY FINE CONDITION.

FRANK SWABB EQUIPMENT CO.

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SEARCHLIGHT SECTION

Prompt Shipment From Our Warehouse

MINING MACHINES

2-12 G3 Goodman 220/3/60 AC 6' bar.
2-12 AB Goodman 250 v. DC 6' bar.
1-35 Jeffrey Low Vein Machine DC Mcne. 36" Ga.

STORAGE BATTERY LOCOMOTIVES

2-6 Ton G. E., Permissible Type LSBE Class 2C6 Form C 9 with 2 HM 625 Ball Bearing Motors 1½" armpliate frame 44" Ga. (Can change to 36" Ga. or less) 1-Locomotive equipped with Gould Lead Battery 12 months of original guarantee, 3 Locomotives equipped with Edison Batteries with as much as 72 months in original guarantee. Length 13½' long, 50" high, 69" wide and 44" Wheel Base. (Can furnish 150 KW G.E. Syn. M.G. Set. 2200 v. 3 ph. 60 cy. 1200 RPM to charge above batteries.)
3-5 Ton Type D Ironton, 36 or 44" Ga.

1-4 Ton Jeffrey 44" Ga. with Battery.

4 Ton General Electric, 36" Ga.

1-5½ Ton Jeffrey 36" Ga. with 49 cell 23 plate New Exide Ironclad Battery

(Haulage)

10 Ton Jeffrey 250 v. 36/42" Ga. MH 110.

10 Ton Westgh. 250 V. 36" or 40" Ga.

8 Ton Westgh. 250 V. 42" Ga.

1-5 Ton West. 250 V. 36 or 42" Ga. /with Electric Gathering Reels. Bar steel frame.

SCREENS

2-4' x 5' single deck Tyler Hummer Screens Type 37 equipped with V-16 Vibrators No. 2860 and 2867 designed for 110 v. AC 15 cy.

MG SETS 3 ph. 60 cy. (Syn.)

150 KW Ridgway 250 V. DC 2200 V. AC 900 RPM.
100 KW Ridgway 250 V. DC—2200 V. AC 1200 RPM.
125 KW Cr. Wh. 250 V. DC—2200 V. AC
30 KW West. 250 V. DC—220 V. AC 1150 RPM.
22½ KW Al. Ch. 125 V. DC—2200 V. AC 900 RPM.

AIR COMPRESSORS

492 cu. ft. 100#C hg. Pneumatic straight line heavy duty Diesel oil driven Compressor unit.

ENGINE GENERATOR SETS

100 KW 250 V. DC Westgh.—Skinner Engine.
50 KW West. 125 V. DC—Skinner Engine.
25 KW Westinghouse 125 V. Steam Turbine.

OIL ENGINE GENERATOR SETS
75 KW G. E. 125 v. DC V Belted to 100 HP Cooper Bessemer 2 cyl. hor. Oil Engine.
Can substitute a 250 v. Generator or a suitable AC Generator of the proper specifications

SLIP RING & SQ. CG MOTORS

(3 ph. 60 cy.)

HP	Make	Speed	Wdg.	Type
200	G.E.	250	S.R.	MT 412
200	G.E.	600	S.R.	I-M
150	Al. Ch.	685	S.R.	
150	G.E.	600	S.R.	IM
125	Al. Ch.	435	S.R.	
100	G.E.	500	S.R.	MI-25 cy.
100	Al. Ch.	575	S.R.	

5 TRACK STEEL TIPPLE

Consisting of large shaker screen, 3 loading booms and picking table, 5 car retarders, 20 inch, 36 inch and 48 inch belt conveyors, crusher, 3 bins for domestic coal, 6 transformers, large number of 220 volt, 3 phase, 60 cycle motors, with gear reducers. Also air cleaning plant, including large blower with 200 HP Syn. motor. Entire tipple in place exactly as when last operated.

PUMPS

250 GPM 250# or 575' Head 2 cyl. Hor. National Transit 6" suc. 4" dis. enclosed driven by 40 HP Motor.

HOISTS

1500 HP Shaft hoist including flywheel MG set operated on 2200 volt 3 phase 60 cycle

75 HP Lidgerwood sgl. fr. drum

50 HP Diamond 2 drums same shaft

52 HP American 2 drum, AC Motor

30 HP Clyde sgl. drum AC Motor

30 HP Double drum—Tandem

15 HP Lidgerwood sgl. dr. AC Motor

400 TRANSFORMERS

(Westgh. & GE 1 ph.)

Qu.	KVA	Pri. V.	Sec. V.
40	5	2080/2200	115/230
31	7½	"	"
28	10	"	"
2	25	2200	244/488
3	37 Rotary	4400/185	115/230
3	37½	2200	220/440
3	50	22000	2200
3	75	2200	110/220

AC AIR BREAKERS (unused)

8—200/400 amp. 3 pole ITE 220 v.

2—300/600 amp. 3 pole ITE 220 v.

12 BU JOY JR. LOADER

Equipped for 220/3/60. Factory rebuilt. Will work in 3" Coal, average 1½ tons per minute.

ROTARY CONVERTERS

100 KW G.E. 275 v. 1200 RPM Type TCC with 3-37½ KVA 2300/4000 v. Transformers and switchboard.

150 KW West. 275 v. 1200 RPM with 2-50 KVA 2300/4000 v. Transformers and switchboards.

MOORHEAD-REITMEYER CO., INC.
PITTSBURGH, PENNSYLVANIA

CEMENT MILL EQUIPMENT

AIR COMPRESSORS BOILER PLANT

CRUSHERS DRYERS

HOISTS KILNS

MILLS STEEL BALLS

Complete Stock Room Supplies. New Gears, Bearings, Belting, Safety Switches, Pumps, Shafting and Pulleys.
New Spare Parts.

• BUCKET ELEVATORS

Thousands of feet of bucket elevators, all sizes of buckets, mostly all steel encased.

STEEL SCREW CONVEYORS

6" -7½" -8" -10" -12" -14" -16".
18" and 20" widths In Steel Box—
Over 10,000 ft. all lengths.

ALLIS-CHALMERS COMPEB MILL

1-#8745 Allis Chalmers Dry Grinding Compeb Mill, 45' long. This is a four compartment mill with the first compartment 10' long and 8' in diameter. The other compartments taper to 7'. The mill has chilled iron liners, and 36" table feeder, 72" Cutler Hammer Magnetic Clutch, and 3 compartment Dust Collector.

MILLS

12-30" Griffen Mills.
1-5½"x22 Smidt tube mill.
11-42" Fuller Lehigh pulverizers, each with belt idler.

CRUSHERS

1-Allis Chalmers Fairmont Roll Crusher, 36"x60".
1-No. 6 McCully gyratory rock crusher, style K.
1-Mosser rotary clinker crusher.

KILNS

2-Vulcan Iron Works steel rotary kilns, 8½"x7½" dia., 125' long, fire brick lined.
3-W. F. Mosser & Son steel rotary kilns, 5½"x5" dia., 60' long, fire brick lined.

DRYERS

2-W. F. Mosser & Son steel rotary dryers, 72"x60" dia., 60' long, bevel gear drive, each with counter shaft.
1-Ruggles 5'x30' Rotary Dryer.

CURRENT SPECIALS

Two—Ironton type WOD double motored 42" ga combination battery-trolley locomotives (without batteries), GE 80 volt ball bearing motors, worm & worm gear drive, ball bearing trucks. Good used condition. Price subject inspection and prior sale, \$1125.00 each.

Two—150 H.P. Brownell boilers. Fire tube 6 x 20 approved for 110 lbs., subject inspection and prior sale \$750.00 each.

One—Sullivan C67 mining machine, 3-60-220 volt, tip turn truck, cable etc.—Subject inspection and prior sale, \$1050.00.

One—100 KW Allis-Chalmers rotary converter, with three 40 KVA transformers, HV 6900 LV 185-92.5. As is, subject inspection and prior sale, \$1350.00.

Two—562 KW Allis-Chalmers turbo-generators, 3 phase 60 cycle 2300 volt, complete with condensers, piping, valves, wiring and switchboards. Price \$10,000.00 per unit, subject inspection and prior sale.

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Reed and Election Streets

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Lathes, Shapers, Milling Machines, Saws etc. for general maintenance work. We have a knowledge of the shop problems of the mine shop. Write or wire us your inquiries.

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COAL CUTTING MACHINES

- 1—12DA Goodman 50 HP, 210 volt DC.
- 1—12AB Goodman 250 volt DC Shortwall.
- 1—36B Jeffrey Longwall 250 volt DC.
- 2—12AA Goodman 250 volts.
- 1—29B Jeffrey Arcwall.
- 2—124 EJ Goodman Slabbing, 250 volt DC.

LOCOMOTIVES

- 1—13 ton G.E. with HM-829 250 V motors.
- 1—10 ton G.E. with HM-830 250 V motors.
- 2—6 ton Jeffrey with MH-88 250 V motors and reels.

ELECTRIC MOTORS

- 1—165 HP G.E. Syn. Motor, 3/60/2200V, 900 RPM.
- 1—100 HP Crocker-Wheeler Syn. Motor, 3/60/2200/1200 RPM.
- 2—50 HP G.E. Slip Ring Motors, same as above, 600 RPM.
- 1—40 HP West. Squirrel Cage Motor, same as above, 900 RPM.
- 1—25 HP West. Type HK, series wound Hoist motor.
- 2—5 HP G.E. Squirrel Cage Motors, 3/60/1200 RPM.

TRANSFORMERS

- 3—150 KVA Pittsburgh 6600-220/440 V.
- 3—100 KVA G.E. 13,200-6600-2200-220/440 V.
- 3—30 KVA West. 2200-110-220 V.

Send us a list of any equipment you may have for sale.

TIPPINS MACHINERY CO.

3530 Forbes St., Pittsburgh 13, Pa.

FOR RENT

Koehring 1½ yd. Dragline, 100' bm. Caterpillar D7 Tractor with bulldozer.

FOR SALE

11—Mack Model AC Dump Trucks, pneumatic tires, capacity 10 to 12 yds. Powered with Cummins Diesel Engines.

Osgood "CHIEF" 2 yd. Shovel, gas Buc. Erie 37B Gas Shovel P & H 60 Shovel-Crane-Dragline Buc. Erie Steam Dragline, 6-8 yds., 175' bm. Buc. Erie Steam Crane Model 308, 40' bm. Buc. Erie 41B Steam Shovel and Crane Moore Speedcrane 15 tons, gas. 63' boom Northwest Model 105 Gas Shovel, 1 yd. Lorain 75B Gas Shovel, 1½ yds. Marion Model 32 Steam Shovel, 1½ yds. Ind. Brownhoist Crane, gas, 40' boom 1 yd. Brownhoist Loco. Crane 35 tons, steam 2—Mack Trucks 6BX, Boulder Type, 12 yds. 3—Sterling Trucks, 170-C, Boulder Type, 12 yds. Allis Chalmers "L" Tractor with bulldozer Caterpillar D6 Tractor with bulldozer Cletrac FD Tractor with bulldozer TD9 Tractor with bulldozer Allis Chalmers "30" Tractor with bulldozer American 75 ton Locomotive, steam. Rebuilt American 50 ton Saddle Tank Switcher Whitcomb 14 ton, 36" gauge Diesel Loco. Davenport 10 ton, std. gauge, gas Loco. Vulcan 8 ton, std. gauge, gas Loco. Vulcan 6 ton, 36" gauge, gas Locomotive Steel Storage Bin 200 tons, ¾" plating Hayward 1 yd. Clam, rehandling Bucket Hais ¾ yd. Clam, rehandling Bucket Erie ¾ yd. Clam, rehandling Bucket Blaw-Knox ¾ yd. Clam, digging Bucket Hayward ½ yd. Clam, digging Bucket

RICHARD P. WALSH CO.
30 Church St. New York 7, N.Y.

A DEPENDABLE SOURCE for

HEAVY EQUIPMENT
CARS — CRANES — COMPRESSORS
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Need cars for Coal, Coke, Ballast, Etc.?

The following list has 767 such cars!

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| 150—Hopper, Double, 50-Ton | 8—Dump, Western, Automatic, |
| 45—Hopper, Side-Discharge, 50-Ton | 27-Yd., 40-Ton |
| 10—Koppel, Side-Discharge, 24-Yd., 30-Ton | 2—Dump, Western, Automatic, 20-Yd., 40-Ton |
| 100—Refrigerator, 40-Ft., 40-Ton | 25—Flat, 40-Ft., 40-Ton |
| 16—Refrigerator, 36-Ft., 30-Ton | 55—Gondola, Composite, 36-Ft. & 40-Ft., 40-Ton |
| 25—Ballast, Composite, 50-Ton | 150—Box, 36-Ft., 40-Ton; Steel Ends |
| 150—Box, 36-Ft., 40-Ton; Steel Ends | 25—Dump, Magor, Automatic, 30-Yd., 50-Ton |
| 6—Dump, Magor, Automatic, 25-Yd., 50-Ton | 6—Dump, Magor, Automatic, 25-Yd., 50-Ton |

Perhaps this list also has some other cars you could use to very beneficial advantage now?

All cars are priced to sell!

IRON AND STEEL PRODUCTS, INC.

39 years' experience

13484 S. Brainard Ave.,

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For Immediate Shipment

- 1—Double Drum Allis Chalmers Tail Rope Hoist Drums 4" Dia. x 36' lg. for 1000 ft. of 3/4" Rope. Rope Speed 360 FPM—60 HP—240/3/60 Slip Ring Motor
- 1—Marion type 460—All Electric Crawler Drag Line, 45' Boom 1½ Yrd Heavy Page Bucket—Elec. Spec. 440/3/60
- 1—19 x 35 Stevenson Single Roll Crusher Machine No. 103 List No. 1706
- 1—42" x 21' Stevens-Adamson Heavy Apron Feeder
- 1—450 ft.—250 RPM—140 lb.—13x7x12 Ingersoll Rand Belt Driven 2 Stage Compressor with Receiver and 100 HP—2200/3/60. Synchronous Motor and Double Leather Belt
- 1—500 ft.—285 RPM—60 lb.—Ingersoll Rand Type ER-I 14" x 10" Single Stage Belt Driven Compressor—75 HP—220 or 440/3/60 Slip Ring Motor
- 1—60 ft.—800 RPM—150 lb.—Gardner-Denver type XH—4½ x 4 Duplex Base Mounted Compressor with 10 HP 220 or 440/3/60 Motor. Start and Stop Control and 30" x 8" Receiver with Std. Equipment
- 1—104 ft.—16" New Dreadnaught Elev. Belt 5 Ply 3/32 and 1/32 Covers
- 1—Ingersoll Rand #63 Concrete Buster 6" Ram, 25" Between Pulling Bars
- 1—300 HP—600 RPM—440/3/60 3 Brdg. Slip Ring Motor with Primary Oil Sw. Drum Controller and Starting Grids
- 1—Silent Chain Drive Used With Above 23 tooth Pinion 90-10, Split Wheel
- 1—100 HP—450 RPM—220 or 440/3/60 3 Brdg. General Electric Slip Ring Motor Complete Hand Control
- 1—100 HP—900 RPM—220/440/3/60—2 Brdg. General Electric Motor Complete Hand Control
- 1—75 HP—900 RPM—220/440/3/60—2 Brdg. General Electric Motor Complete Hand Control
- 1—60 HP—1800 RPM—220/3/60 Westinghouse CS Motor Hand Starting Compensator
- 1—50 HP—720 RPM—440/3/60 General Electric Kt 536 Motor Hand Starting Compensator
- 1—50 HP—900 RPM—220/440/3/60 General Electric Slip Ring Motor Drum Sw. and Grids

We Buy and Sell Industrial Equipment — Send us your Inquiries

Electrical Engineering & Construction Co.

Des Moines 7, Iowa

LOCOMOTIVES

- 1—30 ton Diesel Locomotive, standard gauge, fully equipped, new 1942, used only six months.
- 1—American 41 ton, 4 wheel, saddle tank Locomotive, electric lights, steam brakes, ASME boiler, 190 lbs. Sale or rent.
- 1—Lima 80 ton, six wheel, Switcher with tender, National Board boiler, 200 lbs. working pressure, super heater, automatic lubrication; excellent condition, immediate delivery.
- 1—American 68 ton, 6 wheel, Switcher with tender, electric lights, air brakes, power reverse; over-hauled.

CARS

- 8—20 yd. capacity, K & J, all steel, air dump Cars, lift type doors, cast steel side truck frames, air lifts, air dump.

CRAWLER CRANE

- 1—General ¾ yd. crawler tread with ¾ yd. Blaw Knox clam shell bucket, powered with Buda diesel motor.

OVERHEAD CRANE

- 1—Shepard 7½ ton, 36 ft. span, 220 volt, D.C., bucket operating.

A. J. O'NEILL

LANSDOWNE THEATRE BLDG.

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FOR SALE

- 1—One NORDBERG Hoist No. 06392, 4 ft. drum, hydraulic brake direct connected 150 h.p., G.E. motor AC, 440 v. 3 ph. 60 cycle, speed 585, complete with panel board and ammeter.
- 3—One POMONA Vertical Pump, 75 h.p., AC, 250 v. 60 cy. 3 ph. Westinghouse motor, together with starting compensator, capacity 1000 gal. per min., 200 feet head.
- 4—One ALLIS CHALMERS Pump, type BS 13406, 100 h.p., motor AC, 220 v. 60 cy., 3 ph., capacity 1000 gal. per min., 250 feet head.

All of the above equipment in first class operating condition

FS-200, Coal Age
520 No. Michigan Ave., Chicago, Ill.

SEARCHLIGHT SECTION

REBUILT EQUIPMENT—READY TO SHIP

AIR COMPRESSORS

1—599 cfm. Ingersoll-Rand, 100# pres., Imperial 10, type XB-2, horiz., two stage Duplex, double acting, size 16x14x10x14", complete with 104 HP, 220/440 v., 3 ph., 60 cy. AC motor, complete.

1—888 cfm. Ingersoll-Rand, 100# pres., Imperial 10, type XB-2, horiz., two stage Duplex, double acting, size 19x16x12x16", complete with 150 HP, 220/440 v., 3 ph., 60 cy. AC motor, complete.

MINING MACHINES—250 v. DC

1—CE-7 Sullivan 36" gauge.
2—7 A.U. Sullivan Track Mt'd. 550 v. DC
2—Sullivan 5B Buddy Mining Machines 230 v. DC 5' bar, 2½" kerf.
2—Armatures for CE-7 Sullivan 250 v. D.C.

MINE LOCOMOTIVES

1—3½ ton Ironton Battery 36" ga.
1—6 ton Atlas 4000# D.B.P. with AC or DC Motors 36" ga.

ROTARY CONVERTERS

2—400 kw. G.E. 250 V. D.C. 600 rpm., 2300 v. A.C. complete.

COAL DRILL

1—Little Giant Chicago Pneu. Tool Co., style 473, 220 v., 3 ph., 60 cy., type PM, spec. R867-S1212.

HOISTS

100 HP, Lidgerwood 2 drum A/C or DC Motor
CENTRIFUGAL PUMPS
2—1000 G.P.M. Cameron bronze, 100' hd. 8 x 8.
1—800 G.P.M. Weinman 90' hd. 6 x 5
2—160 G.P.M. Deming Triplex 150# 335' hd. 6 x 8.

TRANSFORMERS—1 ph. 60 cy.

No. Kva.	Pri.	Sec.	Make
1 250	2300	460	G.E.
1 100	2200	110/220	G.E.
3 100	6600	550/440/220	Pgh.
3 50	11430/6600	550	Al. Ch.
3 50	6600	575	G.E.
3 50	Westg.	4000/2200	230/460
1 371	2300	220/440	Wagner
3 37	4400	185	West. (Rotary)
35	10 2200	110/220	G.E.
100	7½ 2200	110/220	G.E.
75	5 2200	110/220	West.

SLIPPING MOTORS—3 ph. 60 cy.

HP	Make	Type	Volts	RPM
400	Westg.	CW	440/220	1170
300	Westg.	CW-1106	2200	580
250	Westg.	CW	2200	345
100	G.E.	I	220	450
100	Westg.	CI	220/440	1750
75	Cr. Wh.		220/440	875
60	Triumph	C-16	220/440	430
60	Westg.	HF	2200	690
53	G.E.	I	220/550	1165

SCALES

9—Howe No. 2734, 3 beams (2 at 200 lbs.—1 at 50 lbs.) Platform 14½ x 22", cap. 500#.

DIESEL ENGINE GENERATOR SET

7—75 KW, 250 v. DC, type SK Westg. Gen. belted to 100 HP Buckeye Horiz. Diesel Engine, complete with swb.

230 V. DC MOTORS

HP	Make	RPM	Type
30	Westg.	1150	SK-110L
35	Westg.	675	SK-140
125	Morg. Gardner	425	—
150	G.E.	500	MPC-6
150	Cr. Wheeler	625	CCD
200	Cr. Wheeler	477	CCD
250	Cr. Wheeler	200/400	CMC
300	Otis	550	—

(With spare armature)

MOTOR GENERATOR SETS

150 Crocker Wheeler 250 v. D. C. 600 rpm., 200/440 or 2300 v. Syn. Motor.

150 KW Ridgeway 250 v. DC, 900 rpm., 2200/3/60, syn.

100 KW Westg. 250 v. DC, 327 rpm., 2200/220 or 440 v., 3/60, syn.

DUQUESNE ELECTRIC & MFG. . . . PITTSBURGH (6), PA.

MINING EQUIPMENT READY FOR DELIVERY

COAL CUTTING MACHINES

1—12-CJ Goodman Shortwall, 250 volt, with or without truck.
1—35-B Jeffrey Shortwall, 250 volt, with or without truck.
2—28-A Jeffrey Shortwall, 250 volt, with or without truck.
1—29-B Jeffrey Arcwall, 250 volt, top cutter, 42 to 48" ga.
1—29-B Jeffrey Arcwall, 250 volt, with 29-C bit motor, 32 to 48" ga.
1—CE-7 Sullivan Shortwall, 220 volt A.C. with or without truck.
2—CE-7 Sullivan Shortwall, 250 or 500 volt
1—35-A Jeffrey Shortwall, 250 volt
2—12-A Goodman machine motors complete, 250 volt D.C.
1—35-B Jeffrey machine motor complete, 250 volt D.C.
6—12-G3 Goodman machine motors comp. 220-440 volt A.C.
3—212-G3 Goodman machine motors comp. 220-440 volt A.C.

LOCOMOTIVES

10-Ton Jeffrey, 42 or 44" ga. 250 volt, 3" frame, 34" high, MH-78 motors
8-Ton G.E. HM-822 motors, 250 volt, 42 to 48" ga. 2½" frame, 33" high
6-Ton Ironton low vein, 250 volt, with G.E. cable reel.
4-Ton G.E. 825 low vein, 250 volt, 42 or 44" ga. comp. with cable reel
1—13-Ton Westinghouse, type 79, 250 volt, 48" ga.
1—10-Ton G.E. HM-809, 250 volt, 48" gage.

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ALL-STATE EQUIPMENT CO., INC.

LOGAN, W. Va. PHONE 884

SUBSTATIONS—POWER PLANTS

9-KW Westinghouse M-G Set. 250 volt D.C. Generator, 220 volt A.C. motor
75-KW Westinghouse M-G Set complete, 2300 volt Sync. motor, 275 volt D.C. gen.
100-KW G.E. Rotary converter, type TC-6, 250 volt, comp. with switchboard
200-KW Westinghouse M-G Set comp. 2300 volt Sync. motor, 275 volt gen.
200-KW G.E. Rotary converter comp. 2300 volt A.C. 275 volt D.C.
150-KW Jeffrey Generator only, 250 volt
100-KW Westinghouse SK-180 generator only, 250 volt
62½ KVA G.E. Alternator comp. 220 volt A.C. with 100-HP. Natural gas engine

ARMATURES

Jeffrey machine, type 35-BB, 29-C, 28-A, 35-B, Goodman 12-A, 12-AA, 12-AB

MISCELLANEOUS

1—5 x 8" Double deck vibrating screen (like new)
1—Fig. 8 Rope drum comp. grooved for 1" rope
1—Cincinnati Coal Drill, 250 volt
2—7½ KVA G.E. Transformers, 2300/115-230 volt
3—Goodman Duckbills, size #1
1—300-HP, G.E. Auto Transformer, 2300 or 4000 volts, for 200-KW, M-G Set
7½, 10, 12, 15, 20, 30, 40-HP. Starting compensators, 220 volt
Locomotive controllers type MB-16-G, MB-17-G, MB-24-C, MB-25-C, MB-26-G and 2 G.E. type R-86

MINE HOISTS

1—Vulcan 30" Band friction will coil 3000 ¾" rope 50 or 60 HP motor.
1—Diamond Band Friction 42" dia. will coil 4000 ft. 7/8" rope—150 hp motor.
1—Connellsville 54" Band friction will coil 5000 ft. 7/8" rope 100 or 150 HP motor.
1—Flory-Keyed drum 52" dia. 150 HP electrical equipment.
1—Vulcan 60" Sliding pinion will coil 3500 ft. 1½" rope. 200 HP motor.
1—Lidgerwood-Cylindro Conical Shaft Hoist—225 ft. 1¼" rope. 300 HP motor.
1—Vulcan-Cylindro Conical Shaft Hoist 350' 1¾" rope. 400 HP motor.
1—Connellsville-Cylindro Conical Shaft Hoist 350' 1½" rope. 800 HP motor.

And other hoists to suit all mining conditions

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Complete Power Plant

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325 Fincastle Bldg., Louisville 2, Ky.

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100 Kw Gen. Elec. Rotary 250/2300 V 6600, 2200 & 440 Volt Transformers
24"x20" Jeffrey 2 Roll Coke Crusher
18"x30" McLanahan Coal Crusher
50 Hp Lidgerwood Double Drum Hoist
R113 Mine Locomotive Controllers
270 GPM Synch. Mtr. Driven Pumps
600 GPM D.C. Mtr. Deep Well Pumps
350 HP 3/60/2200 V Weco S.R. Motor
250 Hp 3/60/2200 V Weco S.R. Motor
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We also manufacture a special Hard Maple Pipe for flushing culm in the Anthracite Region and wood covering for underground steam lines.

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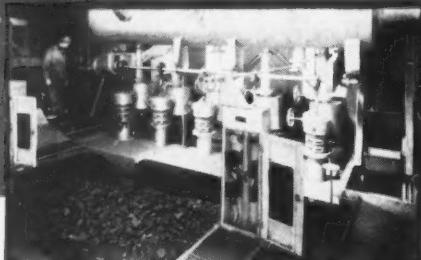
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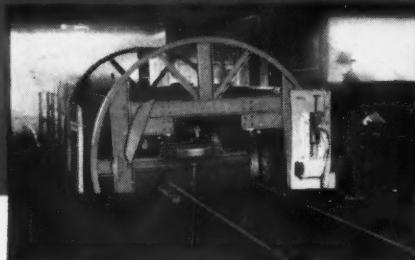
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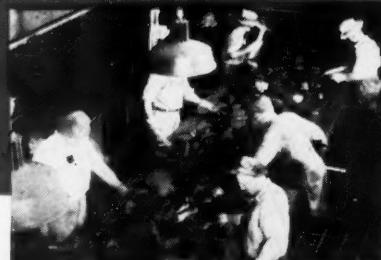
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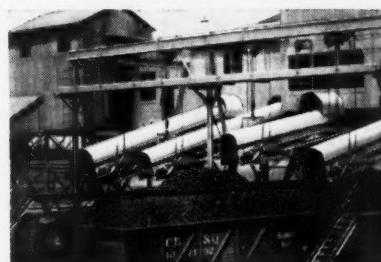
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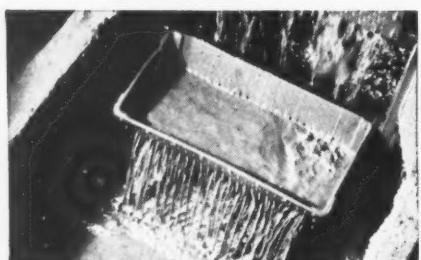
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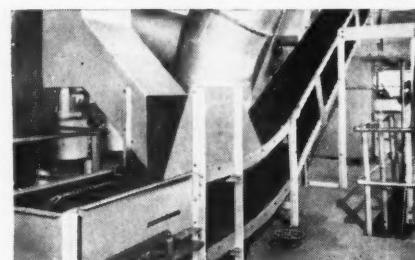
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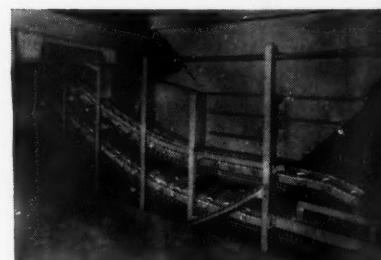
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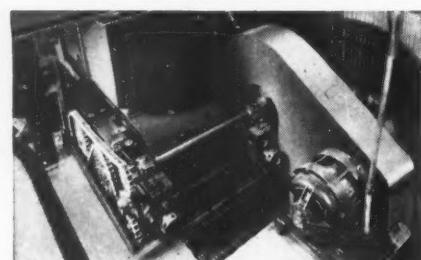
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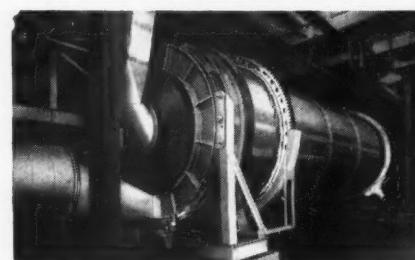
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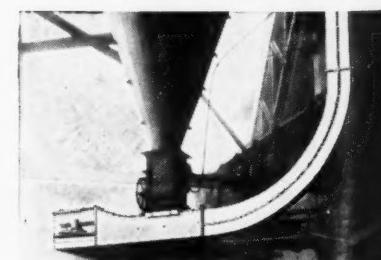
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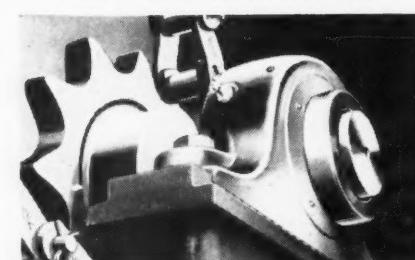
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